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# **AEROSPACE MEDICINE AND BIOLOGY**

**A CONTINUING BIBLIOGRAPHY  
WITH INDEXES**

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION**

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# AEROSPACE MEDICINE AND BIOLOGY

## A CONTINUING BIBLIOGRAPHY WITH INDEXES

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*Scientific and Technical Information Division*

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION**

WASHINGTON, D.C.

OCTOBER 1969

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# INTRODUCTION

*Aerospace Medicine and Biology* is a continuing bibliography which, by means of periodic supplements, serves as a current abstracting and announcement medium for references on this subject. The publication is compiled through the cooperative efforts of the American Institute of Aeronautics and Astronautics (AIAA) and NASA Scientific and Technical Information Facility. It assembles, within the covers of a single bibliographic announcement, groups of references that were formerly announced in separate journals, and provides a convenient compilation for medical and biological scientists. Additional background details for this publication can be found in the first issue, NASA SP-7011, which was published in July, 1964. Supplements are identified by the same number followed by two additional digits in parentheses.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis will be placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry consists of a standard citation accompanied by its abstract in the following order:

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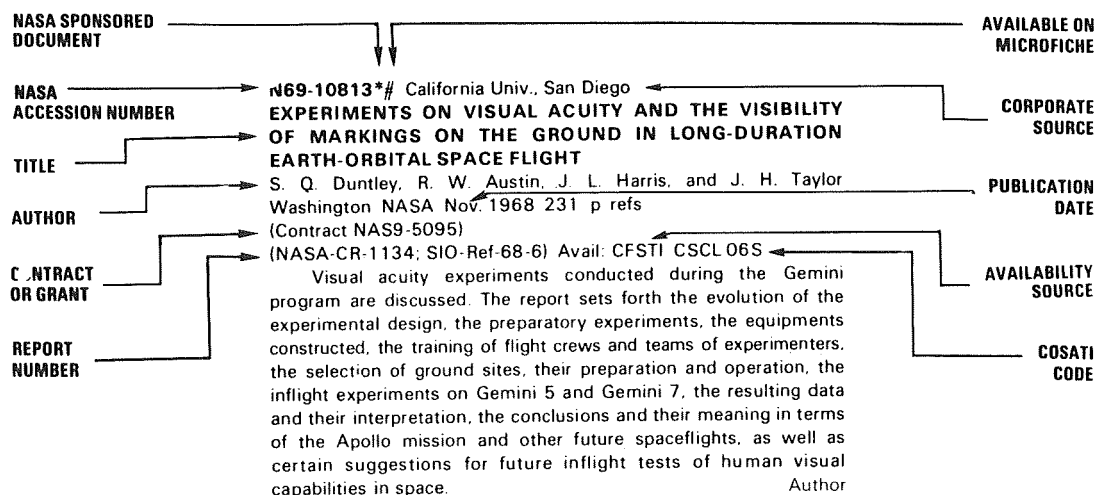
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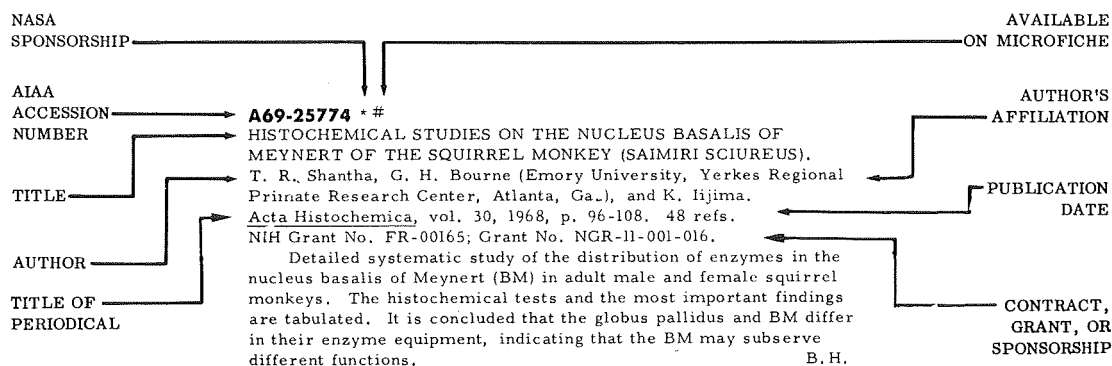
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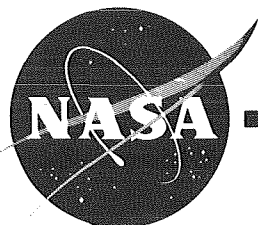
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# AEROSPACE MEDICINE AND BIOLOGY

*a continuing bibliography* OCTOBER 1969

## STAR ENTRIES

**N69-30428\*#** State Univ. of New York at Buffalo. Faculty of Health Sciences.

### **CENTER FOR THEORETICAL BIOLOGY**

1968 140 p refs

(Grant NGR-33-015-016)

(NASA-CR-103206) Avail: CFSTI CSCL 06C

Detailed summaries are presented of the organization, research, and contributions in the area of theoretical biology. Specific sections deal in depth with the following areas of interest: nuclear and cytoplasmic inheritance; models of the central nervous system and sensory communication; receptor structure, function, and isolation; statistical mechanics in biophysical systems; symbolic relational systems; system theory and relational biology; theoretical pharmacology; theory of macromolecules; cell membranes; and quantum biochemistry.

K.R.G.

**N69-30473#** NOLIT Publishing House, Belgrade (Yugoslavia).

### **RECOVERY OF IRRADIATED CELLS AND ORGANISMS BY NUCLEIC ACIDS [OZDRAVLJENJE OZRACENIH CELJA I ORGANIZAMA POMOCU NUKLEINSKIH KISELINA]**

Paul Pignon ed. 1967 173 p refs Transl. into ENGLISH of Bull. Inst. Nucl. Sci. "Boris Kidrich" (Belgrade), v. 17, no. 4/A, Suppl., 1966 Proc. of the Intern. Symp., Herceg Novi, Yugoslavia, 23-24 Jun. 1966 Translated and Published for the AEC and NSF (AEC-tr-6646/4A) Avail: CFSTI

Three areas of interest were covered at the conference: repair of radiation damage, uptake and fate of nucleic acid, and the effect of exogenous nucleic acids and their precursors in irradiated cells. For individual titles, see N69-20474 through N69-30505.

**N69-30474#** NOLIT Publishing House, Belgrade (Yugoslavia).

### **REPAIR OF SINGLE AND DOUBLE BREAKS IN THE DNA OF MICROCCUS RADIODURANS EXPOSED TO X-RAYS**

P. Alexander (Roy. Cancer Hospital, London) et al *In its* Recovery of Irradiated Cells and Organisms by Nucleic Acids 1967 p 1-5 refs (See N69-30473 17-04)

Avail: CFSTI

Enzyme-treated cells were lysed on an alkaline sucrose gradient and centrifuged to obtain single-stranded DNA. The molecular

weight was calculated before and after irradiation. When the cells were lysed and the DNA denatured at different times after irradiation the rate of repair of single breaks could be determined. The repair started immediately and proceeded rapidly after irradiation. By the end of the lag period 70% of the breaks were reconstituted, but the molecular weight was only attained when the DNA complement of the cell had doubled.

NSA

**N69-30475#** NOLIT Publishing House, Belgrade (Yugoslavia).

### **STUDIES ON E. COLI MUTANTS DEFECTIVE IN DNA REPAIR**

Richard Boyce (Yale Univ. School of Med.) et al *In its* Recovery of Irradiated Cells and Organisms by Nucleic Acids 1967 p 7-9 refs (See N69-30473 17-04)

Avail: CFSTI

*Escherichia coli* K12 mutants defective in DNA repair can be divided into two main classes, the excision mutants and the recombination deficient mutants. Effects of methylmethane sulfonate, mitomycin C, nitrogen mustard, UV radiation, and X radiation on the two classes of mutants are summarized in the form of a table.

NSA

**N69-30476#** NOLIT Publishing House, Belgrade (Yugoslavia).

### **RECOVERY OF X-RAY INDUCED DAMAGE IN CHLAMYDOMONAS REINHARDI**

Jana Hillova (Czech. Acad. of Sci., Brno) *In its* Recovery of Irradiated Cells and Organisms by Nucleic Acids 1967 p 11-15 refs (See N69-30473 17-04)

Avail: CFSTI

In experiments with fractionated X-ray doses, the algae were stored in water between two dose fractions for different periods of time (40 to 200 min) at 26°C under continuous illumination. Colony counts were made on agar plates 6 to 7 days after inoculation. The tabulated data show a survival value of 67.5% with a time interval of 200 min between the two doses of 7600 rad each; the survival value was 30.5% with a time interval of 40 min between the two doses.

NSA

**N69-30477#** NOLIT Publishing House, Belgrade (Yugoslavia).

### **AN IN VITRO BONE MARROW SYSTEM FOR STUDYING RECOVERY FROM RADIATION INJURY**

L. H. Smith (ORNL) *In its* Recovery of Irradiated Cells and Organisms by Nucleic Acids 1967 p 17-19 refs Supported by AEC (See N69-30473 17-04)

Avail: CFSTI

Some radiation injury recovery measures were applied to normal mouse bone marrow cells in vitro. These cells were chosen

for study because they constitute a radiation sensitive tissue that is critical to survival of irradiated animals and because their reproductive capacity can be readily assessed and quantified by transplantation into syngeneic irradiated recipients. The primary goal was to develop an in vitro method whereby recovery measures could be tested on mouse bone marrow. For assessing the reproductive capacity of bone marrow cells, the method of  $^{59}\text{Fe}$  uptake by the spleen was used. Many culture variables were tested, and the following optimal conditions were found for normal unirradiated cells: tissue culture medium 199 plus 25% mammalian serum; 5.0 to  $50.0 \times 10^6$  cells/ml; pH 6.8 to 7.6; and stationary cultures. Under these conditions, the major variable was temperature. The efficacy of tissue extracts, including heterologous DNA and RNA, was tested in the mouse marrow system. No substance was found which, when present in the post-radiation environment for up to 24 hours, will effect recovery from X-ray injury. K.R.G.

**N69-30478#** NOLIT Publishing House, Belgrade (Yugoslavia).  
**PHYSICO-CHEMICAL REPAIR OF THYMINE AND DEOXYRIBONUCLEIC ACID EXPOSED TO IONIZING RADIATION**

V. Drasil (Czech. Acad. of Sci., Brno) et al *In its Recovery of Irradiated Cells and Organisms by Nucleic Acids* 1967 p 21-24 (See N69-30473 17-04)

Avail: CFSTI

Thymine dissolved in tritium-labeled water was irradiated. Exchangeable tritium was eliminated after repeated drying and dissolving in stable water; the activity remaining bound in the molecule was then measured. The total amount of tritium incorporated from the water into thymine and the products of its radiolysis were linearly proportional to the radiation dose and the specific activity of the tritium-labeled water. Analogous results were obtained with DNA in tritium-labeled water. NSA

**N69-30479#** NOLIT Publishing House, Belgrade (Yugoslavia).  
**RADIATION RECOVERY IN MAMMALIAN CELLS**

M. M. Elkind (NIH) *In its Recovery of Irradiated Cells and Organisms by Nucleic Acids* 1967 p 25-29 refs (See N69-30473 17-04)

Avail: CFSTI

Log-phase populations of hamster cells were synchronized with a two-hour exposure to hydroxyurea. Cells were given a fractionated dose of 975 rad of X-rays and survival data were recorded in the form of a graph. Results indicate that: repair is weakly dependent on temperature; repair does not require oxygen; new protein synthesis is not required for repair; DNA synthesis is not required for repair; actinomycin D interferes with the expression of a restored capacity for sublethal damage. NSA

**N69-30480#** NOLIT Publishing House, Belgrade (Yugoslavia).  
**RESTORATION CONFERRED ON IRRADIATED BACTERIAL CELLS UPON COMPLETE TRANSFER OF UNIRRADIATED CHROMOSOME**

Ivar Johansen (Norweg. Defence Res. Estab.) *In its Recovery of Irradiated Cells and Organisms by Nucleic Acids* 1967 p 31 (See N69-30473 17-04)

Avail: CFSTI

In the  $\text{Hfr}/\text{F}^-$  mating system of *Escherichia coli* recombinants with an integrated distal male marker appear with a frequency of about 0.1. Analyses of the genetic constitution of these recombinants reveal that slightly less than 50% of their genome originates from the donor cells. X-irradiation of the recipient cells before mating has little effect on the distribution of male and female genetic material in the recombinants. Furthermore, the frequency of recombinants decreases with increasing dose, and the dose-response

curve is not markedly different from the survival curve for recipient cells. The findings suggest that a major part of the lethal X-ray induced damage to bacteria may be ascribed to effects on the bacterial chromosome. NSA

**N69-30481#** NOLIT Publishing House, Belgrade (Yugoslavia).  
**RECOVERY PROCESSES IN X-IRRADIATED L-CELLS**

Antun Han (Rudjer Boskovic Inst., Zagreb) et al *In its Recovery of Irradiated Cells and Organisms by Nucleic Acids* 1967 p 33-35 refs (See N69-30473 17-04)

Avail: CFSTI

When UV light was delivered a few hours before the first X-ray dose an inhibition in initial recovery occurred similar to that when UV light was delivered after the first X-ray dose. This indicated that the UV effect was not caused by a delay in repair processes, but that it was caused by high UV sensitivity of structures or systems involved in recovery. Recovery was not altered when the replacement of thymine by bromo-uracil in cellular DNA was about 15%. Therefore, recovery in cells containing some bromo-uracil in DNA suggested that the mechanism of enhanced radiosensitivity was not associated with destruction of the mechanism underlying the repair process. Fluoro-uridine affected the synthesis of both DNA and RNA. NSA

**N69-30482#** NOLIT Publishing House, Belgrade (Yugoslavia).  
**DELAYED POST-IRRADIATION PHENOMENA IN CULTURES OF MURINE LEUKAEMIC LYMPHOBLASTS L 5178Y HYPERSENSITIVITY TO LOW DILUTIONS**

J. Z. Beer (Inst. of Nucl. Res., Warsaw) et al *In its Recovery of Irradiated Cells and Organisms by Nucleic Acids* 1967 p 37-42 refs (See N69-30473 17-04)

Avail: CFSTI

Two strains of murine leukemic lymphoblasts differing in radiosensitivity were used. It was found that populations of the sensitive strain that survived several generations after X-radiation grew in cultures diluted below the lower limit of logarithmic growth at a rate much lower than the unirradiated populations. The difference in behavior between control and irradiated populations gradually decreased. The phenomenon of hypersensitivity to low dilutions made it possible to reveal a sublethal radiobiological lesion that was transferred in irradiation-surviving populations through several tens of generations. Possible causes of the radiobiological lesion and its repair are discussed. NSA

**N69-30483#** NOLIT Publishing House, Belgrade (Yugoslavia).  
**ABSORPTION AND FATE OF EXOGENOUS DNA IN LIVING SYSTEMS**

L. Ledoux (Centre d'Etude de l'Energie Nucl., Mol, Belgium) et al *In its Recovery of Irradiated Cells and Organisms by Nucleic Acids* 1967 p 44-50 refs Supported jointly by EURATOM and CEN (See N69-30473 17-04)

Avail: CFSTI

The DNA- $^3\text{H}$   $\text{D}_2\text{O}$  from *B. subtilis* was injected intravenously in immature mice treated 28 hours earlier with oestradiol. Blood samples were taken at 0, 5, 10, and 60 minutes and analyzed in CsCl gradients. The results show that the DNA disappears rapidly from the blood without being degraded to acid-soluble components. However, some depolymerization occurs at the same time. It is concluded that exogenous DNA can be taken up by certain organs or tissues of living animals or plants, and in some cases it replicates and appears to be integrated into the cell genome. These results offer a biochemical basis for the effects of high molecular DNA on the fate of living cells. However, it is also concluded that the phenomena are very complex and might be different from

organism to organism and even from organ to organ in a given organism.  
K.R.G.

**N69-30484#** NOLIT Publishing House, Belgrade (Yugoslavia).

**FATE OF EXOGENOUS DNA IN CELLS IN VITRO**

B. A. Neskovic (School of Med., Belgrade) et al *In its Recovery of Irradiated Cells and Organisms by Nucleic Acids* 1967 p 51-54 refs (See N69-30473 17-04)

Avail: CFSTI

The fate of exogenous DNA introduced into animal and bacteria cells is examined. Difficulties in using autoradiographical methods in this type of analysis are dealt with. Sixty mg of radioactive DNA per ml of medium was introduced in a monolayer culture of L-strain cells. The DNA was extracted by the method of Marmur (Sueoca) from L cells grown in the presence of  $^{32}\text{P}$  or thymidine  $^3\text{H}$  for 48 hours. Two kinds of radioactivity were found in all the preparations not treated with DNA: (1) agglomerates of grains above the vacuolized parts of the cytoplasm, in 5% to 10% of the cells treated with DNA- $^{32}\text{P}$  and in 0.5% to 1% of cells treated with DNA- $^3\text{H}$ . These agglomerations were rarely found above the nuclei. The DNA- $^{32}\text{P}$  was mostly found in multinucleated cells, while DNA- $^3\text{H}$  was usually found in mononuclear cells; (2) individual grains above the cytoplasm and nucleus, 2 to 3 times more frequently than the background, randomly scattered, and unbound.  
K.R.G.

**N69-30485#** NOLIT Publishing House, Belgrade (Yugoslavia).

**LOCALIZATION OF INCORPORATED DNA IN HOST CELL**

M. Hill (Czech. Acad. of Sci., Brno) *In its Recovery of Irradiated Cells and Organisms by Nucleic Acids* 1967 p 55-58 refs (See N69-30473 17-04)

Avail: CFSTI

A series of experiments was performed to investigate the assumed mechanism operating in host cells which is capable of deciding whether incorporated foreign DNA will be fixed in the nucleus, or released and metabolized. The following patterns of DNA incorporation into the recipient cell were found in various systems in vitro: (1) DNA plus recipient cell: for lymphocytes with uptake of single DNA molecules, accumulation in the nucleus; for L cells with uptake of single DNA molecules, uniform distribution in the nucleus and cytoplasm; and (2) donor cells plus recipient cells: with uptake of DNA molecules and/or chromosome fragments released from damaged donors, accumulation in the nucleolar-associated chromatin; with nuclear fusion, formation of synkaryon. In light of findings on translocation phenomena in donor-recipient cell systems in vitro, it is concluded that similar events probably take place in vivo.  
K.R.G.

**N69-30486#** NOLIT Publishing House, Belgrade (Yugoslavia).

**THE FATE OF EXOGENOUS DNA IN UV-IRRADIATED L CELLS**

O. Djordjevic (Boris Kidric Inst. of Nucl. Sci., Beograd) et al *In its Recovery of Irradiated Cells and Organisms by Nucleic Acids* 1967 p 59-62 refs (See N69-30473 17-04)

Avail: CFSTI

Highly polymerized  $^{14}\text{C}$ -DNA was extracted from L cells labeled with  $^{14}\text{C}$ -thymidine. L cells in the logarithmic phase of growth were uv-irradiated and resuspended in calf serum containing  $^{14}\text{C}$ -DNA. The total radioactivity of the medium decreased with incubation time for both normal and irradiated cells, but at a faster rate in non-irradiated cultures. After 24 hours of incubation 80% of non-irradiated cells were labeled; after the same interval in irradiated cultures only 55% of the cells were labeled. The labeled chromosomes found 24 hrs after incubation of nonirradiated and

irradiated cells with  $^{14}\text{C}$ -DNA indicated strongly that exogenous  $^{14}\text{C}$ -DNA or its fragments were incorporated into the DNA of recipient cells.  
NSA

**N69-30487#** NOLIT Publishing House, Belgrade (Yugoslavia).

**EFFECTS OF EXOGENOUS DNA ON IRRADIATED MAMMALIAN CELLS**

L. A. Smets (Nijmegen Univ., Netherlands) *In its Recovery of Irradiated Cells and Organisms by Nucleic Acids* 1967 p 65-67 (See N69-30473 17-04)

Avail: CFSTI

Indirect evidence suggested the involvement of DNases in the alterations in DNA metabolism after ionizing radiation. The observed turnover in nascent strands following X-ray treatment of cells includes not only additional synthesis but also breakdown of existing DNA by DNA-splitting enzymes. This turnover will hardly decrease initial damage since during neosynthesis damage in templates could be copied, giving rise to double hit instead of randomly scattered single hit damages. It is proposed that exogenous DNA reverts irradiation effects according to the enzyme capture hypothesis. This hypothesis holds that DNases are occupied by the exogenous substrate after its incorporation and thus are prevented from damaging cellular DNA, either directly or during radiation-induced turnover in nascent strands. The relation of the findings with increased survival observed by others is not yet clear.  
Author (NSA)

**N69-30488#** NOLIT Publishing House, Belgrade (Yugoslavia).

**CLONE SIZE DISTRIBUTION OF HeLa CELLS TREATED WITH DNA PRECURSORS**

A. H. W. Nias (Christie Hospital and Holt Radium Inst., Manchester, England) et al *In its Recovery of Irradiated Cells and Organisms by Nucleic Acids* 1967 p 69-72 (See N69-30473 17-04)

Avail: CFSTI

HeLa cells were irradiated and an equimolar solution of the four deoxyribonucleosides was added to the culture medium; the cells were cultured for ten days before fixation. The mean colony counts are tabulated; the percentage survival of the irradiated cells is compared with controls in both treated and untreated groups. With a concentration of  $10\text{ }\mu\text{g/ml}$  of nucleosides, the clone size distribution showed no difference between the treated and untreated cell populations and no effect on the proliferation rates. The increased survival percentage obtained with this dosage can therefore be accepted as a true restoration of radiation damage.  
NSA

**N69-30489#** NOLIT Publishing House, Belgrade (Yugoslavia).

**REPAIR OF LETHAL RADIATION DAMAGE IN L CELLS BY DEOXYRIBONUCLEOTIDES, AS RELATED TO CELL CYCLE**

D. Petrovic (Rudjer Boskovic Inst., Zagreb) et al *In its Recovery of Irradiated Cells and Organisms by Nucleic Acids* 1967 p 73-75 refs (See N69-30473 17-04)

Avail: CFSTI

The L cells were synchronized and about 80% were in mitosis. Culture flasks were irradiated hourly with 500 R during the first cell cycle. After irradiation, an equimolar solution of the four deoxyribonucleotides was added to half of the flasks of each lot and all samples were then incubated for two weeks and the colonies counted. The phases of the cell cycle were determined by labeling the synchronized cells for 20 min with tritium-labeled thymidine and the use of autoradiography. A histogram is presented to show the survival of cells irradiated with 500 R at different times after mitosis and the restorative effect of the nucleotides. The cells are about ten times more radioresistant in the  $G_1$  period than

in the middle of the S period. The restorative effect of the nucleotides increases toward the S period and remains quite high during the whole of S with a drop in the middle of it. In  $G_1$  there is no restorative effect. NSA

**N69-30490#** NOLIT Publishing House, Belgrade (Yugoslavia).  
**THE EFFECT OF EXOGENOUS DEOXYRIBONUCLEIC ACIDS ON THE MITOSIS OF IRRADIATED AND NON-IRRADIATED MERISTEMATIC CELLS OF *VICIA FABA***

J. Slotova (Czech. Acad. of Sci., Brno) *In its Recovery of Irradiated Cells and Organisms by Nucleic Acids* 1967 p 77-81 refs (See N69-30473 17-04)

Avail: CFSTI

Primary roots of *Vicia faba* were irradiated on the sixth day after germination. After irradiation the roots were transferred to a DNA solution in which they remained for 2, 4, 6, 8, 16, and 24 hrs. A decrease of mitotic activity in irradiated root cells was recorded for 2, 4, and 6 hrs. For intervals of 8 and 16 hrs a gradual increase occurred so that the mitotic activities of the experimental and control groups were equal 24 hrs after irradiation. The decrease in mitotic activity of the roots kept in DNA solution was not as pronounced during the early intervals and the mitotic index reached the value of the control group sooner. The effect was more pronounced in roots cultivated in isologous DNA after irradiation. NSA

**N69-30491#** NOLIT Publishing House, Belgrade (Yugoslavia).  
**RESTORATION OF X-RAY DAMAGED PLANT TISSUE CULTURES BY NUCLEIC ACIDS AND RELATED PRODUCTS**

M. I. Duarte (Paris Univ.) et al *In its Recovery of Irradiated Cells and Organisms by Nucleic Acids* 1967 p 83-89 refs (See N69-30473 17-04)

Avail: CFSTI

A review of the literature on plant growth-stimulating factors and their influence on restoration of radiation damage is presented. It was found that coconut milk, which contains indoleacetic acid and a kinin derived from nucleic acids, was not able to restore radiation damage in *Scorzonera* crown gall. However, a fraction prepared from yeast RNA promoted restoration of radiation damage. An extract of tobacco leaves was shown to be capable of restoring cultures of tobacco crown gall tissue after irradiation. It was thought that a kinin derived from nucleic acids was responsible for the restoring effect. NSA

**N69-30492#** NOLIT Publishing House, Belgrade (Yugoslavia).  
**SOME ASPECTS OF THE EFFECTS OF NUCLEIC ACIDS ON SURVIVAL OF IRRADIATED ANIMALS**

T. Wilczok (Inst. of Oncology, Gliwice, Poland) *In its Recovery of Irradiated Cells and Organisms by Nucleic Acids* 1967 p 91-96 (See N69-30473 17-04)

Avail: CFSTI

A review of the literature on radioprotective effects of nucleic acids is presented. Results obtained by various workers from studies on protective effects of homologous and heterologous DNA against lethal doses of radiation are discussed. Studies on molecular weights of DNA showed that DNA of higher molecular weights has greater therapeutic efficiency. Effects of  $\gamma$  radiation on the differential blood count of rats were studied; following treatment with DNA the blood picture was normal after the fifth day following irradiation, but seven to twelve days were required for restoration when sodium chloride was substituted for DNA. Studies on post-irradiation injection of tritium-labeled DNA led to the following hypothesis: DNA can circulate in the blood stream in a native

macromolecular state where it adsorbs to lymphocytes; these cells or their fragments carry it to the bone marrow and the lymphatic tissues; thus the exogenous DNA is made available in situ to cells and tissues for repair of radiation damage. Effects of DNA on immunological properties of irradiated animals are discussed. NSA

**N69-30493#** NOLIT Publishing House, Belgrade (Yugoslavia).  
**RECOVERY EFFECT OF HOMOLOGOUS AND HETEROLOGOUS DNA FROM DIFFERENT ORGANS INJECTED INTO TOTAL-BODY IRRADIATED (600 R) INFANTILE MALE RATS AND ADULT MALE RATS**

N. Savkovic (Boris Kidric Inst. of Nucl. Sci., Vinca) *In its Recovery of Irradiated Cells and Organisms by Nucleic Acids* 1967 p 98-102 (See N69-30473 17-04)

Avail: CFSTI

Rats and mice of different ages were exposed to an X-ray dose of 600 R; one half of each group was treated with DNA. Results, presented in the form of graphs, show that in all cases the survival of animals treated with DNA was greater than that of control animals. Results were similar for homologous and heterologous DNA extracted from liver, spleen, and thymus. NSA

**N69-30494#** NOLIT Publishing House, Belgrade (Yugoslavia).  
**THE EFFECT OF NATIVE, DENATURED, RENATURED AND DEGRADED DNA ON THE SURVIVAL OF LETHALLY IRRADIATED RATS**

J. Mendecki (Inst. of Oncology, Gliwice, Poland) et al *In its Recovery of Irradiated Cells and Organisms by Nucleic Acids* 1967 p 103-106 (See N69-30473 17-04)

Avail: CFSTI

Rats were given 1000 R of  $\gamma$  radiation and injected intraperitoneally with the following DNA preparations: native, denatured, renatured, degraded native, degraded denatured, single stranded, and DNase-treated. Control rats were injected with sodium chloride. A table is presented to show percent survival after 30 days of the rats treated with different DNA preparations. Control animals died within 19 days. After 30 days, the survival of rats given native DNA was 62%; that of rats given denatured DNA was 57%; renatured, 60%; degraded native, 0%; degraded denatured, 0%; single stranded, 32%; and DNase-treated, 0%. The significance of the molecular weights of the various DNA preparations in relation to survival of rats is discussed. NSA

**N69-30495#** NOLIT Publishing House, Belgrade (Yugoslavia).  
**RESEARCH ON THE KINETICS OF DEATH AFTER WHOLE-BODY IRRADIATION WITH X-RAYS OR GAMMA-RAYS**

H. Neumann (Inst. of Oncology, Gliwice, Poland) et al *In its Recovery of Irradiated Cells and Organisms by Nucleic Acids* 1967 p 107-110 (See N69-30473 17-04)

Avail: CFSTI

Rats were irradiated at various dose rates and treated with DNA or sodium chloride. In attempting to get a maximum number of survivals of animals with radiation sickness after LD 100 treatment with DNA, the radiobiological threshold effect was obtained within a dose range of 1 to 2 R/min. Animals irradiated with LD 100 at high dose rates did not survive the radiation sickness despite DNA treatment, while rats given the same total dose but at dose rates of only 1 to 2 R/min exhibited 30 to 80% survival when treated with DNA. Control rats treated with sodium chloride; all died within a period of 15 to 30 days. NSA

**N69-30496#** NOLIT Publishing House, Belgrade (Yugoslavia).  
**DNA REPAIR OF RADIATION DAMAGE IN THE CIRCULATING BLOOD OF RATS**



Stanislaw Gotba (Inst. of Oncology, Gliwice, Poland) et al *In its Recovery of Irradiated Cells and Organisms by Nucleic Acids* 1967 p 111-113 (See N69-30473 17-04)

Avail: CFSTI

Exogenous DNA administered to rats after irradiation with a lethal dose of  $\gamma$  radiation had a significant effect on the survival weight and the recovery of erythrocytes, hemoglobin and white cell count in the circulating blood. Highly polymerized DNA from calf thymus was injected intraperitoneally within 48 hrs after irradiation. Control rats were given sodium chloride. Seven days after irradiation the erythrocyte count began to decrease; however, within 30 days the count returned to normal in the DNA-treated rats. In control rats the count decreased and death occurred within three weeks. The leukocyte count decreased drastically during the first 24 hrs after irradiation in all rats, reaching its lowest value after three days. From the 14th day after irradiation a great increase in leukocyte count was observed in the DNA-treated rats, but not in control rats. NSA

**N69-30497#** NOLIT Publishing House, Belgrade (Yugoslavia). **SPONTANEOUS AND RADIATION INDUCED CHROMOSOME ABERRATIONS IN THE BONE MARROW OF RATS IN VIVO**

V. Jankovic-Stejin (Boris Kidric Inst. of Nucl. Sci., Vinca) et al *In its Recovery of Irradiated Cells and Organisms by Nucleic Acids* 1967 p 115-119 refs (See N69-30473 17-04)

Avail: CFSTI

Chromosome examinations were made on four groups of rats: normal, DNA-treated, X-irradiated, DNA-treated and X-irradiated. The bone marrow of rats treated with DNA contained a higher frequency of abnormal cells and also a higher frequency of aberrations per cell than that of normal rats. Examination of cells from bone marrow of irradiated rats revealed changes in number and arrangement of chromosomes and structural damage. The most frequent aberrations were acentric chromosomes formed by breakage in the centromere zone. All types of aberrations occurred with a frequency considerably greater than that of control animals. In irradiated animals treated with DNA the frequency of aberrations was lower. NSA

**N69-30498#** NOLIT Publishing House, Belgrade (Yugoslavia). **THE EFFECT OF DNA AND OTHER HUMORAL FACTORS ON RECOVERY OF HAEMATOPOIETIC TISSUE**

Vera Juraskova (Czech. Acad. of Sci., Brno) et al *In its Recovery of Irradiated Cells and Organisms by Nucleic Acids* 1967 p 121-125 refs (See N69-30473 17-04)

Avail: CFSTI

Mice were given a 650 R dose of X radiation and were then injected intraperitoneally with DNA, milk, thymidylc acid, and ascites tumor cells. Control mice were given saline solution. Recovery of hematopoietic tissue was determined using the spleen colony method. The tabulated results show that all substances increased the number of colonies. NSA

**N69-30499#** NOLIT Publishing House, Belgrade (Yugoslavia). **RECOVERY OF REPRODUCTIVE ABILITY BY HOMOLOGOUS TESTES, LIVER, SPLEEN, THYMUS AND KIDNEY DNA OF RATS IRRADIATED DURING THE INFANTILE PERIOD**

N. Savkovic (Boris Kidric Inst. of Nucl. Sci., Vinca) *In its Recovery of Irradiated Cells and Organisms by Nucleic Acids* 1967 p 127-132 (See N69-30473 17-04)

Avail: CFSTI

Male rats, aged 8 and 17 days, were given 600 R of X-radiation. One group was treated with DNA extracted from

kidney, liver, spleen, testes, and thymus. On reaching maturity the rats were mated with normal females. Fertility of males was estimated from the number of pregnant females and histological examination of the reproductive organs. Results showed that it was possible. Results showed that reproductive organs recovered from radiation damage when treated with DNA from the various organs. It is thought that nucleic acids repair the structure of the damaged nucleic acids in the irradiated organism. NSA

**N69-30500#** NOLIT Publishing House, Belgrade (Yugoslavia). **RECOVERY EFFECT OF HIGHLY POLYMERIZED HOMOLOGOUS TESTIS AND LIVER DEOXYRIBONUCLEIC ACID (DNA) ON THE SEMINIFEROUS EPITHELIUM OF X-IRRADIATED RATS**

A. Popovic (Boris Kidric Inst. of Nucl. Sci., Vinca) et al *In its Recovery of Irradiated Cells and Organisms by Nucleic Acids* 1967 p 133-137 refs (See N69-30473 17-04)

Avail: CFSTI

Male rats were X-irradiated with doses of 500 and 750 R. DNA from testis was injected intraperitoneally into rats given 500 R, and DNA from liver was injected into rats given 750 R. Microscopic examination of testes showed that in rats treated with DNA there was less damage to the seminiferous epithelium and greater survival of spermatogonia and spermatocytes. NSA

**N69-30501#** NOLIT Publishing House, Belgrade (Yugoslavia). **RESTORATION AND ENHANCEMENT OF ANTIBODY SYNTHESIS BY NUCLEIC ACID DIGESTS AND COLCHICINE**

Bernard N. Jaroslow (Argonne Natl. Lab.) *In its Recovery of Irradiated Cells and Organisms by Nucleic Acids* 1967 p 139-145 refs (See N69-30473 17-04)

Avail: CFSTI

The effects of colchicine on the hemolysin response were tested in X-irradiated and unirradiated rabbits. It was observed that colchicine in progressively increasing amounts stimulated the production of hemolysin at higher rates in both irradiated and unirradiated groups, but the length of the latent period and the duration of antibody production was not modified by colchicine. The role of nucleic acids in these phenomena is discussed. It is believed that cytotoxic agents enhance antibody formation by supplying extra amounts of nucleic acid degradation products that stimulate cells to produce appropriate enzymes for nucleic acid synthesis, and in the presence of antigen the processes leading to antibody production are initiated. NSA

**N69-30502#** NOLIT Publishing House, Belgrade (Yugoslavia). **RESTORATION OF THE ANTIBODY-FORMING CAPACITY OF IRRADIATED RATS BY MEANS OF NUCLEIC ACIDS**

Miroslav M. Simic (Boris Kidric Inst. of Nucl. Sci., Vinca) et al *In its Recovery of Irradiated Cells and Organisms by Nucleic Acids* 1967 p 147-150 refs (See N69-30473 17-04)

Avail: CFSTI

Rats were given 400 to 600 R of X-radiation one or two days before immunization with sheep erythrocytes. They were given nucleic acid preparations from the day of irradiation through four or five days. Results demonstrated that only a fraction of the total damage caused by radiation can be restored by postirradiation treatment with nucleic acids from spleens of homologous donor rats, while the major part of the injury is irreparable under such experimental conditions. The experiment in which both DNA and RNA, isolated from spleen of preimmunized rats, were simultaneously administered after irradiation, strongly suggests that specific preimmunization of prospective nucleic acid donors can increase the degree of restoration of the hemolysin response in irradiated rats. NSA

**N69-30503#** NOLIT Publishing House, Belgrade (Yugoslavia).  
**EARLY EFFECTS OF THE HOMOLOGOUS DNA OF IRRADIATED L-STRAIN CELLS**

B. A. Neskovic (School of Med., Beograd) et al *In its* Recovery of Irradiated Cells and Organisms by Nucleic Acids 1967 p 151-154 refs (See N69-30473 17-04)  
 Avail: CFSTI

The DNA was introduced into a culture of L cells immediately after the cells were  $\gamma$ -irradiated with a dose of 700 rads. Photomicrographs were made at regular intervals for ten days. The photographs were analyzed for duration of interphase, transition from one interphase to the next, time when the first normal mitosis appears, time when endoreduplication appears, time when pathologic mitosis appears, and number of cells one hour after irradiation and after 41, 144, 202, and 228 hours. The effect of radiation was to slow down the mitotic process during the first 48 hrs. The number of cells in DNA-treated cultures increased by 100% in 41 hrs. The first appearance of endoreduplication of chromosomes occurred after 19 hrs in cells with exogenous DNA, and at the 25th hr in cells without exogenous DNA. NSA

**N69-30504#** NOLIT Publishing House, Belgrade (Yugoslavia).  
**THE EFFECT OF ISOLOGOUS DNA ON THE METABOLISM OF DNA IN UV-IRRADIATED L-CELLS**

Lj. Kostic (Boris Kidric Inst. of Nucl. Sci., Vinca) et al *In its* Recovery of Irradiated Cells and Organisms by Nucleic Acids 1967 p 155-158 refs (See N69-30473 17-04)  
 Avail: CFSTI

The L cells were irradiated with UV light in the logarithmic phase of growth. Survival was followed by counting cells cultivated in suspension. For metabolism studies irradiated and nonirradiated cells were plated in a medium containing  $^{14}\text{C}$ -DNA. The survival of L cells was about 50% following UV irradiation. When DNA was added to the irradiated culture immediately after irradiation the survival rate was 86% four days after irradiation. NSA

**N69-30505#** NOLIT Publishing House, Belgrade (Yugoslavia).  
**EFFECT OF HOMOLOGOUS TESTIS DEOXYRIBONUCLEIC ACID ON THE TESTIS CELL RIBONUCLEIC ACID METABOLISM OF LETHALLY IRRADIATED RATS**

Aleksandar Becarevic (Boris Kidric Inst. of Nucl. Sci., Vinca) et al *In its* Recovery of Irradiated Cells and Organisms by Nucleic Acids p 159-163 refs (See N69-30473 17-04)  
 Avail: CFSTI

Rats were given 850 R of X-radiation, and DNA was administered to irradiated and nonirradiated rats. Before killing, each animal was injected intraperitoneally with radioactive phosphate. All animals were sacrificed 29 hrs after irradiation or administration of DNA. Graphs are presented to show metabolic activity of RNA in testis cells. Results showed that irradiation strongly inhibited the capacity of testis cells to incorporate radioactive phosphorus into its RNA, but the decrease of incorporation was particularly pronounced in the ribosomal RNA. However, the radioinduced metabolic lesion was reduced by treatment with native homologous testis DNA. NSA

**N69-30688** North Carolina Univ., Chapel Hill.  
**BLOOD FLOW AND OXYGEN CONSUMPTION IN RESTING SKELETAL MUSCLE**

Gideon Beer (Ph.D. Thesis) 1968 140 p  
 Avail: Univ. Microfilms: HC \$6.60/Microfilm \$3.00 Order No. 69-1576

Blood flow to the muscle was controlled by a perfusion pump; measurements were made of blood pressure, arterial and venous oxygen contents, arterial and venous lactate contents, and CFC. Resting skeletal muscles produced lactate at rates ranging

from 0.20 to 2.10  $\mu\text{M}/\text{min} \times 100 \text{ gm}$ . Reduction of blood flow was associated with higher venous lactate levels. Lactate production was increased when moderate reduction of blood flow was imposed and decreased when flow reduction was substantial. An absolute relationship between blood flow (oxygen supply) and lactate production in the resting muscle could not be obtained. Oxygen deficits incurred during periods of reduced flow were never accurately repaid when blood flow was restored. The results indicate that the extraction of oxygen is closely associated with the capillary surface area available for filtration and diffusion, and that oxygen consumption of the muscle is dependent on the tissue perfusion at the microcirculatory level. Dissert. Abstr.

**N69-30695\*#** Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.  
**A MATHEMATICAL MODEL OF THE EFFECT OF A PREDATOR ON SPECIES DIVERSITY**

J. N. Yang and C. R. Weston 15 Jun. 1969 22 p refs  
 (Contract NAS7-100)  
 (NASA-CR-103242; JPL-TR-32-1359) Avail: CFSTI CSCL 06C

The presence of two species in the same environment with a common limiting resource is paradoxical if competition for the limiting resource is the only consideration: one or the other of the species must be eliminated. This analysis shows that a normally unsuccessful competitor for the limiting resource may persist when there is a predator on the otherwise successful species. The modified assumption and different parametric values which are considered do not alter this generalization. The working model is of bacteria growing in a chemostat; however, there is no reason to assume the resultant conclusions are restricted to a bacterial system, an experimental situation, or terrestrial organisms. Author

**N69-30701#** Joint Publications Research Service, Washington, D.C.

**RADIOBIOLOGY, VOLUME 8, NO. 3**

Nov. 1968 208 p refs Transl. into ENGLISH of Radiobiologia (Moscow), v. 8, no. 3, 1968 Transl. for the AEC  
 (AEC-TR-6916) Avail: CFSTI

Radiobiological studies on cells, seeds, and animals are presented. For individual titles, see N69-30702 through N69-20721.

**N69-30702#** Joint Publications Research Service, Washington, D.C.

**SOME ASPECTS OF THE PROTECTION OF NUCLEOPROTEINS FROM THE INFLUENCE OF IONIZING RADIATION**

A. N. Pisarevskii et al *In its* Radiobiology, vol. 8, no. 3, 1968 p 1-11 refs (See N69-30701 17-04)  
 Avail: CFSTI

The comparative radiosensitivity of deoxyribonucleoprotein (DNP) was studied in the gel and condensed states. It was shown that the radioresistance of formed nucleoprotein strands is increased by one to two orders of magnitude. The introduction of a number of protective substances into a DNP gel leads to an increase in the critical dose leading to loss of the structure-forming properties. The best protective ability is possessed by AET and MPA and gallates. Irradiation of DNP gels by doses below the critical dose not lead to any change in the number of structuromechanical properties, if protective substances are introduced into the DNP gels before irradiation. The greatest activity is possessed by FINAM. In the irradiation of condensed DNP structures, the change in the relaxation properties is entirely suppressed when AET and MPA are introduced into solution. Author

**N69-30703#** Joint Publications Research Service, Washington, D.C.

**INFLUENCE OF IRRADIATION ON THE COMPOSITION OF MESSENGER RNA DURING EARLY LOACH EMBRYOGENESIS**

S. R. Umanskii *In its Radiobiology*, vol. 8, no. 3 1968 p 12-22 refs (See N69-30701 17-04)

Avail: CFSTI

The population of RNA in normal and irradiated loach embryos was compared at various stages of development by the method of artificial DNA-RNA hybridization. It was shown that the activation of new genes during early loach embryogenesis is accomplished periodically. The periods of activation of the genes coincide with the periods of morphogenetic activity of the nuclei. Irradiation before the beginning of gene activation almost entirely suppresses this process, at the same time without producing a repression of already active genes. Author

**N69-30704#** Joint Publications Research Service, Washington, D.C.

**URINE PROTEINS DURING ACUTE RADIATION SICKNESS OF ANIMALS**

G. A. Sedgenidze et al *In its Radiobiology*, Vol. 8, No. 3 1968 p 23-33 refs (See N69-30701 17-04)

Avail: CFSTI

The urine proteins of intact rats of the Avgust line and animals subjected to whole-body irradiation by the  $\gamma$ -rays of  $^{60}\text{Co}$ , were subjected to an electro- and immunoelectrophoretic investigation. Cross-exhausted and unexhausted rabbit immune sera against uroproteins of intact and irradiated animals, as well as against proteins of the blood, mitochondria, microsomes, and hyaloplasm of kidney cells, were used to develop the electrophoretograms. In the uroproteins of the intact rats, six fractions differing in electrophoretic mobility were detected, containing 11 antigens, five of which were represented by blood serum proteins, while six were uroproteins specific for the urine, also determined in the proteins of the hyaloplasm and microsomes of kidney cells. Radiation sickness of the animals is accompanied by phase changes in the kidney function. Author

**N69-30705#** Joint Publications Research Service, Washington, D.C.

**INFLUENCE OF GALASCORBIN ON THE RESPIRATION AND OXIDATIVE PHOSPHORYLATION OF LIVER MITOCHONDRIA AFTER IRRADIATION OF ANIMALS**

E. F. Shamrai et al *In its Radiobiology*, vol. 8, no. 3 p 34-38 refs (See N69-30701 17-04)

Avail: CFSTI

In radiation sickness, disturbances of the intracellular metabolism are observed, including the energy metabolism, lying at the basis of all the vital processes. The question of the influence of ionizing radiation upon the processes of tissue metabolism and oxidative phosphorylation has been insufficiently studied. Determining the indices of the energy metabolism after various types of irradiation (local and total) and various doses (sublethal and lethal), as well as determining the possibility of influencing these processes by the use of a physiological complex of vitamins C and P (galascorbin) were studied. Author

**N69-30706#** Joint Publications Research Service, Washington, D.C.

**POSTRADIATION CHANGES OF MOUSE AND RAT BONE MARROW CELLS DURING INCUBATION IN VITRO**

L. A. Kharlamova *In its Radiobiology*, vol. 8, no. 3 1968 p 39-46 refs (See N69-30701 17-04)

Avail: CFSTI

The dynamics of the inactivation, death, and lysis of bone marrow cells was studied in nonirradiated and irradiated suspensions incubated at  $37^\circ$  in vitro. The dynamics of inactivation (loss of ability for unlimited multiplication) of hematogenic stem cells in mouse bone marrow suspensions was determined by the method of spleen colonies. Death and lysis of nucleated cells were judged according to the decrease in the number of cells that were not stained by eosin and were not lysed. It was established that the kinetic principles of these processes are the same. Irradiation at a dose of 100 and 190 r led to an acceleration of the inactivation of those stem cells which retained their ability for unlimited division immediately after irradiation. An acceleration of the processes of death and lysis of nucleated cells in vitro was observed only in the case of irradiation at doses of 1000 r and more. Author

**N69-30707#** Joint Publications Research Service, Washington, D.C.

**STUDY OF THE DIRECT AND REMOTE EFFECTS OF RADIATION ON BONE MARROW**

A. L. Vygodskaya et al *In its Radiobiology*, Vol. 8, No. 3 1968 p 47-59 (See N69-30701 17-04) refs

Avail: CFSTI

Cell destruction and the change in the number of cells of different fractions in rat bone marrow under the influence of direct and remote action of radiation during the first two days after irradiation at a dose of 1000 r with one limb shielded were studied. The existence of remote influences of radiation upon hematogenic tissue, manifested in a substantial cell destruction in the shielded bone marrow, was established. It was shown that the remote effect is due to a sharp decrease in the number of erythroid cells and a certain decrease in the number of myeloid cells. The number of lymphocytes in the shielded bone marrow does not change significantly. The causes of the drop in the number of cells of different fractions of the shielded and irradiated bone marrow are analyzed. Author

**N69-30708#** Joint Publications Research Service, Washington, D.C.

**COMPARATIVE STUDY OF THE EFFECTS OF X-RAY AND GAMMA-RADIATION ON THE SURVIVAL OF RATS UNDER CONDITIONS OF NONUNIFORM INFLUENCES**

G. M. Avetisov *In its Radiobiology*, Vol. 8, No. 3 1968 p 60-65 (See N69-30701 17-04) refs

Avail: CFSTI

The peculiarities of the biological effects of X-ray and  $\gamma$ -radiations were demonstrated in experiments on rats by comparing them under conditions of nonuniform influences. A consideration of the spatial distribution of the tissue doses makes it possible to explain the qualitative and quantitative peculiarities of the course of radiation injury in nonuniform fields. In a comparison of the biological effectiveness of different types of radiations, a strict consideration of the spatial distribution of doses is needed. Author

**N69-30709#** Joint Publications Research Service, Washington, D.C.

**RECOVERY OF THE FETUS AND PLACENTA AFTER RADIATION INFLUENCE**

V. E. Kogan *In its Radiobiology*, Vol. 8, No. 3 1968 p 66-74 (See N69-30701 17-04) refs

Avail: CFSTI

The change in the state of fetuses and placentas was studied 3-7-9 days after irradiation of female rats on the tenth day of pregnancy at a dose of 25 r on the 13th, 17th, and 19th days of pregnancy. It was shown that on the 13th day of pregnancy, the

vascularization of the fetal placenta is reduced, and the lifetime of the fetuses under conditions of total oxygen starvation is shortened (69.7 minutes in the experimental group, compared with 104.9 minutes in the control). Subsequently, a gradual repair of the vascular disorders in the placenta is observed: by the 17th day of pregnancy, no underdevelopment of the fetal vascular network in the labyrinth portion of the irradiated placentas is detected. Normalization of the response of the fetuses to total oxygen starvation does not set in until the 19th day of pregnancy. Thus, together with a high radiation vulnerability of the fetus, a substantial ability for repair after the disturbances of development is detected.

Author

**N69-30710#** Joint Publications Research Service, Washington, D.C.

**RADIOSENSITIVITY OF DEVELOPING TENCH EMBRYOS (TINCA TINCA L.)**

I. V. Kulikov et al. *In Its Radiobiology*, Vol. 8, No. 3 1968 p 75-81 (See N69-30701 17-04) refs

Avail: CFSTI

The effects of aqueous solutions of  $^{90}\text{Sr}$  and  $^{90}\text{Y}$  and external irradiation by the  $\gamma$ -rays of cobalt-60 upon the embryonic development of the tench were studied under laboratory conditions. Incubation of fertilized tench roe in aqueous solutions of  $^{90}\text{Sr}$  and  $^{90}\text{Y}$  with a concentration from  $10^{-10}$  to  $10^{-5}$  curie/liter has no appreciable effect either upon the rate of development of the embryos or upon the quantitatively yield of normal and abnormal prelarvae from this roe. The survival rate of the prelarvae for 10 days after hatching from the roe incubated in radioactive water does not differ from the control. The prelarvae that hatched from the roe incubated in radioactive solutions proved to be just as resistant to supplementary external  $\gamma$ -irradiation (dose 800 r) as the controls.

Author

**N69-30711#** Joint Publications Research Service, Washington, D.C.

**RADIOSENSITIVITY OF THE MEMBRANES OF ISOLATED NUCLEI OF NERVE AND GLIAL CELLS**

K. Sh. Nadareishvili et al. *In Its Radiobiology*, Vol. 8, No. 3 1968 p 82-91 (See N69-30701 17-04) refs

Avail: CFSTI

The kinetics of the hypotonic and alkaline decomposition of isolated nuclei obtained from the brains of four-week-old rats was studied. The nuclei were isolated by the method of Shobo with modifications. A suspension of nuclei in an isotonic sucrose solution was irradiated at  $1.5^{\circ}\text{--}2^{\circ}\text{C}$ , then diluted with 0.25 percent neutral or alkaline NaCl solution, and the kinetics of the decomposition of the nuclei determined at room temperature. The number of nuclei in suspension was counted both microscopically and with an electronic particle counter. The experiments indicated that a statistically significant radiation effect is detected at a dose of 500 r for nuclei of astrocytes and at 1000 r for the nuclei of neurons and oligodendrocytes.

Author

**N69-30712#** Joint Publications Research Service, Washington, D.C.

**PHYSIOLOGICAL ANALYSIS OF THE ROLE OF THE SYNAPSE IN DISTURBANCES OF THE ACTIVITY OF THE NEUROMUSCULAR APPARATUS AFTER IRRADIATION**

A. E. Ulyanitskaya *In Its Radiobiology*, Vol. 8, No. 3 1968 p 92-98 refs (See N69-30701 17-04)

Avail: CFSTI

In irradiation of a neuromuscular preparation of *m. sartorius-n. ischiadicus* of the frog at a dose of 18-20 krad, a distinct decrease in the work capacity of the muscle begins, detectable according

to its contraction in response to stimulation of a motor nerve. At the same time, in the case of direct stimulation the work capacity of the muscle does not differ from the norm. A dose of 18-20 krad does not produce any changes either in the threshold of excitation or in the action potential of the nerve. The action potentials of the muscle in the case of stimulation of a motor nerve become lower than in the control. In the case of direct stimulation of the muscle they are higher, producing an initial deterioration of the work of the muscle in response to stimulation of a motor nerve. Such a dose does not lower the work capacity either of the motor nerve or of the excitable muscle membrane. Consequently, a disruption of the myoneural synaptic transmission is responsible for the primary injurious effect observed immediately after irradiation.

Author

**N69-30713#** Joint Publications Research Service, Washington, D.C.

**SOME DISPUTED QUESTIONS IN THE PROBLEM OF POST RADIATION RECOVERY OF THE CHROMOSOMES**

N. V. Luchnik *In Its Radiobiology*, Vol. 8, No. 3 1968 p 99-111 (See N69-30701 17-04) refs

Avail: CFSTI

In this article, the term recovery is used to denote nonrealization of latent damages, a consideration of which is limited to the cytogenetic level. Evidence is cited against the idea that the formation of observable chromosome aberrations is based upon true breaks. Most of the facts support the correctness of the template theory. The impossibility, without making more or less arbitrary assumptions, of determining the rate of recovery and time of realization using existing facilities was demonstrated. The results of experiments indicating that cellular and local recovery involves processes that occur at the presynthetic and synthetic stages of the cellular cycle, respectively, were analyzed. Possible molecular mechanisms of both types of recovery are discussed.

Author

**N69-30714#** Joint Publications Research Service, Washington, D.C.

**LUMINESCENCE-CYTOCHEMICAL INVESTIGATION OF THE EFFECTS OF GAMMA-RAYS AND RADIOTOXINS ON CELLS OF EHRlich ASCITES CARCINOMA**

V. G. Kondratenko et al. *In Its Radiobiology*, Vol. 8, No. 3 1968 p 112-121 refs (See N69-30701 17-04)

Avail: CFSTI

A comparative investigation was made of the effects of  $\gamma$ -rays and quinoid radiotoxins on Ehrlich cancer cells. Using a cytofluorimetric method, it was shown that in the development of radiation damage to cellular nuclei, there is an almost complete analogy both under the action of ionizing radiation and under the action of radiotoxins. It was established that there is a dose and time dependence, and in the case of the action of radiotoxins a concentration dependence as well, in the development of radiation reactions in the DNA-protein complex of the nuclei. It is noted that the effects of radiation anabolites upon cellular nuclei begin to be manifested practically simultaneously with the effects of radiation. It is concluded that in the development of radiation effects, the role of a starter mechanism is played by the action of the ionizing rays, and an important role is played by the effects of radiation anabolites.

Author

**N69-30715#** Joint Publications Research Service, Washington, D.C.

**ELECTROLYTE COMPOSITION OF THE BLOOD PLASMA AND LIQUOR IN RABBITS IRRADIATED AFTER PROPHYLACTIC ADMINISTRATION OF CYSTAMINE**

A. G. Kuzovkov et al *In Its Radiobiology*, Vol. 8, No. 3 1968  
p 122-127 refs (See N69-30701 17-04)  
Avail: CFSTI

The content of sodium, potassium, and calcium ions in the spinomedullary fluid and in the blood plasma taken from the carotid artery and medullary venous sinus was studied in experiments on rabbits by the method of flame photometry. The indices of the calcium content reflect the total value of ionized and bound calcium. Irradiation of the animals is accompanied by pronounced hypokaliemia and a slightly increased sodium level. Cystamine administered before irradiation normalizes the potassium metabolism in the animal organism after irradiation and somewhat increases the sodium and calcium ion content in the blood in this case.

Author

**N69-30716#** Joint Publications Research Services, Washington, D.C.

**RELATIONSHIP BETWEEN THE FLUORINE AND CALCIUM CONTENTS IN THE DIET AND THE RESISTANCE OF ANIMALS TO THE INFLUENCE OF GAMMA-IRRADIATION**

V. A. Knizhnikov et al *In Its Radiobiology*, Vol. 8, No. 3 1968  
p 128-134 refs (See N69-30709 17-04)

Avail: CFSTI

The significance of the level of intake of calcium and the trace element fluorine with the diet for the radioresistance of animals to single and fractionated whole-body  $\gamma$ -irradiation was studied in chronic experiments on 312 noninbred white rats. It was established that a diet enriched in calcium and fluorine substantially increases the radioresistance of the animals.

Author

**N69-30717#** Joint Publications Research Service, Washington, D.C.

**EXPERIMENTAL STUDY OF THE EFFECTIVENESS OF CYSTAMINE IN THE CASE OF PROLONGED INFLUENCE OF GAMMA-RAYS ON RATS**

D. I. Zelyakova *In Its Radiobiology*, Vol. 8, No. 3 1968  
p 135-139 refs (See N69-30701 17-04)

Avail: CFSTI

The effectiveness of the radioprotective action of cystamine and that of cystamine with amygdalin in various doses and courses of administration in the case of prolonged external  $\gamma$ -irradiation at a dose rate of 16.7 r/hour up to a total dose of 2000 r was studied on an experiment on 140 rats. The indicated dose produces 80-100 percent death of the animals within a 30-day period. It was established that the administration of the preparations before the beginning of irradiation and repeated administration during irradiation at a daily dose of 150mg/kg are ineffective. Repeated administration of the preparations in a daily dose of 450 mg/kg has a pronounced toxic effect. The causes of the absence of effectiveness of cystamine under conditions of the irradiation model studied are discussed.

Author

**N69-30718#** Joint Publications Research Services, Washington, D.C.

**RESTORATION OF RADIATION DAMAGES TO COTTON SEEDS DURING PROLONGED STORAGE**

N. M. Berezina et al *In Its Radiobiology*, Vol. 8, no. 3 1968  
p 140-145 (See N69-30701 17-04) refs

Avail: CFSTI

It was established that cotton seeds irradiated at a lethal dose of 40 kr show a restoration of the viability lost under the influence of irradiation when they are stored for prolonged periods under laboratory conditions. All the seeds freshly irradiated at this dose die in the stage of the cotyledon leaves. Seeds stored for 6 and 12 months after irradiation develop true leaves, buds, and

bloom. The restoration of viability is paralleled by a restoration of a whole series of physiological and biochemical disorders, arising in the freshly irradiated seeds: the chlorophyll content is restored, as is the activity of oxidative enzymes, and the content of radiotoxins is reduced. During prolonged storage of irradiated cotton seeds, a decrease in the radiation damages arising during irradiation of air-dried seeds at a dose of 40 kr is observed.

Author

**N69-30719#** Joint Publications Research Service, Washington, D.C.

**JOINT ACTION OF GAMMA-IRRADIATION AND THERMAL SHOCKS ON *ARABIDOPSIS THALIANA* (L) HEYNH. SEEDS**

Ch. V. Nikolov et al *In Its Radiobiology*, Vol. 8, No. 3 1968  
p 146-153 refs (See N69-3070 17-04)

Avail: CFSTI

Air-dried seeds were subjected to  $\gamma$ -irradiation at doses of 40, 80, 120, and 160 kr, as well as to a temperature influence of 100°C for 30 minutes. Thermal shocks were applied before, after, or before and after irradiation. In the control and experimental groups of plants, death of the plants in the phases of the cotyledons and rosette, growth of the root and stem, the rate of passage through the basic phases of development, and fertility were studied. Postirradiation thermal shocks intensified the effects of irradiation, while preradiation and double shocks weakened them. The possible mechanisms of the influence of thermal shocks upon the radiobiological responses of seeds are discussed.

Author

**N69-30720#** Joint Publications Research Service, Washington, D.C.

**INFLUENCE OF TRACE ELEMENTS ON THE SENSITIVITY OF SEEDS TO FAST FISSION NEUTRONS**

G. V. Ponomarev *In Its Radiobiology*, Vol. 8, No. 3 1968  
p 154-160 refs (See N69-30701 17-04)

Avail: CFSTI

Within the range of fast fission neutron tissue doses up to 600 rad, no changes could be established in the radiosensitivity of barley seeds preliminarily germinated on a medium with an increased amount of boron. Preliminary germination on a medium with an increased amount of zinc increases the resistance of the seeds to fast fission neutrons. Preliminary germination against a background of polyvalent cations (Fe, Mn, Co) increased the sensitivity of the seeds to fast fission neutrons. A relationship was noted between the increase in the radio sensitivity of the seeds and the maximum valence of the metal ions.

Author

**N69-30721#** Joint Publications Research Service, Washington, D.C.

**USE OF THE "STEBEL" GAMMA-APPARATUS IN EXPERIMENTAL RADIOBIOLOGY**

G. T. Ratner et al *In Its Radiobiology*, Vol. 8, No. 3 1968  
p 161-166 refs (See N69-30701 17-04)

Avail: CFSTI

A dosimetric investigation was made of the dose distribution within the working chamber of the Stebel apparatus with a radioactive charge of  $^{137}\text{Cs}$ , which broadens the possibility of utilizing it in radiobiological experiments where it is necessary to know the exact dose distribution over the volume being irradiated. The dose distribution was measured in air and a tissue equivalent phantom by chemical dosimetry. The dose rate in the center of the chamber can be varied from 750 to 100 rad/minute with the aid of inserted lead shields. By considering the parameters studied, good reproducible conditions of irradiation and accuracy of dosimetry can be ensured.

Author

**N69-30914#** Oregon State Univ., Corvallis. Radiation Center.  
**STUDIES ON ENVIRONMENTAL POLLUTION BY MISSILE PROPELLANTS** Final Report, May 1964-Jun. 1967  
 Frank N. Dost, D. J. Reed, and C. H. Wang Wright-Patterson AFB,  
 Ohio AMRL Feb. 1969 39 p refs  
 (Contract AF 33(615)-1767)  
 (AD-686459; AMRL-TR-68-85) Avail: CFSTI CSCL 6/20

The effects of single experimental exposures of plants, fish and microorganisms to members of a group of inorganic fluoride oxidizing agents have been summarized. The information obtained has enabled estimation of the damage to be expected as a result of single accidental exposures in the field. These agents--nitrogen trifluoride (NF<sub>3</sub>), tetrafluorohydrazine (N<sub>2</sub>F<sub>4</sub>), oxygen difluoride (OF<sub>2</sub>), chlorine trifluoride (ClF<sub>3</sub>), bromine pentafluoride (BrF<sub>5</sub>), and chlorine pentafluoride (ClF<sub>5</sub>)--vary in chemical behavior and biological effects. NF<sub>3</sub> is relatively innocuous; OF<sub>2</sub> must be avoided absolutely by animals and plants, and both are quite stable chemically. The interhalogens react readily in contact with environmental constituents, and while destructive at the site of initial contact, they are self limiting in effect. N<sub>2</sub>F<sub>4</sub> also reacts easily, but should cause only moderate damage. Plant injury in all cases would probably be limited to the currently growing crop, with little possibility of carry-over effects in soil. Author (TAB)

**N69-30940#** Aerojet-General Corp., Los Angeles, Calif. Space Div.  
**ELECTRICAL COUPLING AND NORMAL MODES OF OSCILLATION IN DENSE EXCITABLE CELLULAR STRUCTURES** Final Report  
 Charles E. Hendrix Mar. 1969 19 p refs  
 (Contract N00014-67-C-0361)  
 (AD-684886; AGC/SD-9082/FR) Avail: CFSTI CSCL 6/4

The study of monostable electrochemical systems, of which the best known example is the iron-nitric acid interface, has led to the concept of distributed cellular systems in which the individual cells can be in either an active or a passive state, and can influence the state of neighboring cells. Such systems show promise for the synthesis of a new class of information-processing machines, characterized by ease of manufacture, high packing density and plasticity of internal structure. They are also of considerable utility as physical models of living brain tissue. Complex electrochemical systems and living neural tissue can both sustain oscillatory activity. In living systems, such oscillations are often associated with pathological conditions: e.g. epilepsy, heart fibrillation. The present studies have experimentally demonstrated controlled electrochemical oscillations of two types: cyclic reverberation in a closed loop, and epileptiform discharge in a sheet of simulated cortex. The conditions of onset and maintenance of such discharges have been determined and are well understood; it is now possible to design electrochemical oscillators or oscillation suppression systems as required, within limitations. In addition, a scaling law (analogous to those used in hydrodynamic model testing) was developed to permit the quantitative study of current distributions in morphologically complex cellular structures. Such structures may be constructed using bulk electrochemical techniques. Author (TAB)

**N69-30970#** Oesterreichische Studiengesellschaft fuer Atomenergie G.M.B.H., Siebersdorf. Institut fuer Biologie.  
**THE PROTEIN SYNTHESIS DURING THE DEVELOPMENT CYCLE OF THE SINGLE-CELL GREEN ALGA CHLORELLA PYRENOIDOSA [DIE PROTEINSYNTHESE IM VERLAUF DES ENTWICKLUNGSZYKLUS DER EINZELLIGEN GRUENALGE CHLORELLA PYRENOIDOSA]**  
 H. Altman, F. Fetter, E. Cabella, and A. v. Szilvinyi Mar. 1969 11 p refs In AUSTRIAN  
 (SGAE-BL-31/1969) Avail: CFSTI

The protein content and the differences in the protein composition in synchronous cells of *Chlorella pyrenoidosa* were examined. The experimental method entailed determination of the total nitrogen and dry substances of the chlorella during a development cycle and separation of the soluble proteins by means of the disc electrophoresis of polyacrylamide. It was noted that the maximum synthesis of the soluble proteins coincides with the commencement of the development cycle and continues up to the seventh hour. The composition of the proteins was found to be subject to great fluctuations during the progression of the cycle. Transl. by K.W.

**N69-30986\*#** Naval Aerospace Medical Inst., Pensacola, Fla.  
**EVALUATION OF OTOLITH ORGAN FUNCTION BY MEANS OF OCULAR COUNTERROLLING MEASUREMENTS**  
 Earl F. Miller, II 20 Mar. 1969 17 p refs  
 (NASA Order R-93; NASA Order W-12396)  
 (NASA-CR-103256; NAMI-1063) Avail: CFSTI CSCL 06P

Measurements of ocular counterrolling by the photographic method provide specific and valid otolith function information. The precision of the test method has extended the usefulness of ocular counterrolling as an indicator of otolith function of individuals with severe macular destruction as well as normals subjected to conditions which act physiologically to deafferent these organs such as near weightlessness of aerospace flight. Author

**N69-31027#** Army Chemical Center, Edgewood, Md. Medical Research Lab.  
**OXIDATIVE INJURY TO HUMAN RED CELLS BY COPPER SULFATE** Technical Report, Jun. 1967-Jun. 1968  
 Earl N. Metz Feb. 1969 19 p refs  
 (AD-684911; EATR-4254) Avail: CFSTI CSCL 6/20

In vitro experiments suggest that prolonged exposure of red cells to high concentrations of copper sulfate produces red cell injury analogous to that which occurs when cells deficient in glucose-6-phosphate dehydrogenase (G6PD) are exposed to oxidant compounds. By enzyme inhibition and acceleration of auto-oxidation, cupric ion in excess limits the ability of the red cell to maintain normal amounts of reduced glutathione (GSH) and at the same time increases the oxidant stress in the cell by release of H<sub>2</sub>O<sub>2</sub>. By this means copper poisoning alone could lead to hemolysis but would be even more hazardous if it occurred in persons genetically deficient in G6PD, glutathione reductase, or glutathione peroxidase, or in persons receiving drugs capable of generating hydrogen peroxide. Author (TAB)

**N69-31050#** Federal Aviation Administration, Oklahoma City, Okla. Office of Aviation Medicine.  
**PHYSIOLOGICAL STUDIES ON AIR TANKER PILOTS FLYING FOREST FIRE RETARDANT MISSIONS**  
 C. E. Melton, Marlene Wicks, J. T. Saldivar, Jr., Jack Morgan, and Florence P. Vance Oct. 1968 12 p refs  
 (AM-68-26)

Preflight and postflight studies were carried out on five air tanker pilots; in-flight studies were carried out on four of these five pilots. Pre- and postflight studies consisted of a questionnaire and determinations of blood pressure, psycho-motor performance and urine chemistry for stress metabolites. In-flight studies consisted of ECG, rectal temperature, cockpit temperature and voice transmissions, all continuously recorded on magnetic tape. None of the measurements indicated that a significant amount of stress was involved nor was fatigue evident. Heart rates correspond to those of sedentary workers, though doubling of heart rate occurred during two emergencies (hydraulic line failure). Heart rate followed a consistent pattern during flights with the minimums occurring en route to and from fires and maximums during retardant drops. Author

**N69-31152#** California Univ., Berkeley. Lawrence Radiation Lab.  
**PARTIAL NUCLEOTIDE SEQUENCES FOR THREE UNIQUE  
 T-1 R-NASE FRAGMENTS OF TMV-RNA**

David A. Lloyd (Ph. D. Thesis) Jan. 1969 176 p refs  
 (Contract W-7405-ENG-48)

(PB-182945; UCRL-18672) Avail: CFSTI CSCL 06A

Three fragments having chainlengths of 26, 26, and 70 nucleotides, have been isolated from T-1 ribonuclease digests of TMV-RNA. These fragments appear to be unique in the TMA-RNA molecule. None of the three fragments can be a portion of the gene which codes for the TMV coat protein. Attempts to gain further information about the sequences of these fragments are also discussed. In this connection, a possible C-specific nuclease first reported by Anderson and Carter was investigated. USGRDR

**N69-31203#** Tracor, Inc., Austin, Tex.  
**ON STUDIES OF BINAURAL INTERACTION** Summary  
**Report**

Bruce H. Deatherage and Thomas R. Evans Mar. 1969 36 p refs

(Contract Nonr-4193(00))

(AD-684829; TRACOR-69-358-U) Avail: CFSTI CSCL 6/16

The study sought to examine the temporal relations of binaural masking as compared with monaural masking for conditions of forward, simultaneous, and backward masking. Five aural conditions of different signal-masker configurations and a number of temporal relations were examined to determine the masking effects of a tone by a tonal masker. A discussion of the various contralateral masking conditions is presented. Author (TAB)

**N69-31204#** Bolt, Beranek, and Newman, Inc., Cambridge, Mass.  
**COMPUTER SYSTEMS FOR TEACHING COMPLEX  
 CONCEPTS** Final Report, 1 Oct. 1963-30 Sep. 1968

Wallace Feurzeig Mar. 1969 191 p refs

(Contract Nonr-4340(00))

(AD-684831; BBN-1742) Avail: CFSTI CSCL 5/9

This research concerns various ways of using computers for teaching problem-solving concepts and skills. New lines of approach to programmed teaching, programming, and instructional monitoring were investigated in various instructional contexts including mathematics, physics, and medicine. Four programming systems--Mentor, Stringcomp, Simon, and Logo--were designed and used as an integral part of these investigations. The systems are described and their capabilities demonstrated in instructional applications of several kinds. The work suggests some new ways in which computers might make valuable contributions to education.

(1) The teaching of appropriate programming languages can provide a conceptual and operational framework for the teaching of mathematics. (2) Utilizing diagnostic cues, instructional monitors can enhance the teaching of practical subjects (navigation, languages, music) whose mastery requires the integration of mechanical and intellectual skills. Author (TAB)

**N69-31266#** Armed Forces Radiobiology Research Inst., Bethesda, Md.

**A MINIATURE TISSUE-EQUIVALENT IONIZATION  
 CHAMBER FOR PULSE DOSIMETRY**

C. S. Kuritzky, F. R. Shonka, H. O. Wyckoff, and W. F. Pfeiffer Nov. 1968 18 p refs

(AD-684824; AFRR-1N68-9) Avail: CFSTI CSCL 6/18

For radiobiological purposes it is desirable to measure the absorbed dose in the material of interest with a high degree of accuracy and precision. In regions of large spatial variation it is important that the detector be as small as possible. To meet both

requirements a miniature three-terminal tissue-equivalent ionization chamber was designed. It was produced by using injection molding and ultrasonic welding techniques. The chamber has an outside diameter of 5.5 mm and an ionizing volume of approximately 0.01 cu cm. The chamber was exposed to pulses from the AFRR-TRIGA reactor to evaluate its collection efficiency and precision. For 100,000-rad pulses with peak dose rates of 10 million rads per second the collection efficiency was measured to be 85 percent. For 7000-rad pulses the collection efficiency was 98 percent. The precision of the chamber for fifteen 1000-rad pulses gave a standard deviation of 0.2 percent. Author (TAB)

**N69-31318#** Institute of Oncology, Warsaw (Poland).  
**RESEARCH WORK OF THE INSTITUTE FOR 1966 [RAPORT  
 Z PRAC BADAWCZYCH PROWADZONYCH W 1966 ROKU]**  
**Annual Report**

W. Jasinskiog 1967 148 p refs In POLISH

(NEIC-RR-26) Avail: AEC Depository Libraries

Progress is reported on research at the Institute of Oncology in Poland. Studies were conducted on the treatment of malignant tumors. Highest frequencies of carcinomas were found to be: cervical cancer, cancer of the skin and lip, mammary cancer, cancer of the alimentary tract, and bronchial cancer. The influence of environmental factors on mortality rates was investigated. Research in experimental oncology included studies on cytogenetics, immunology, biochemistry, and histochemistry. Investigations were conducted on the pathology of stomach cancer with special attention to the relation between structure and clinical progression of the disease. Other studies were conducted on clinical chemistry, improvements in  $\gamma$  and x ray therapy techniques, and clinical applications of radioisotopes. NSA

**N69-31323#** Joint Publications Research Service, Washington, D.C.

**DOLPHIN DERMAL RIDGES, BODY STREAMLINING  
 STUDIED**

V. Ye. Sokolov et al 8 Jul. 1969 7 p refs Transl. into ENGLISH from Byul. Mosk. Obschestva Ispytatelei Prirody, Otd. Biol. (Moscow), no. 3 1968 p 123-126

(JPRS-48363) Avail: CFSTI

The placement of dermal ridges, and their papillae on the body of cetaceans is studied in three different species of dolphins. It is hypothesized that the orientation of the dermal ridges is caused by the requirement that the integument resist the stream of water, when the animal is swimming, to effect laminar flow. An analysis of the distinct dermal ridge patterns for each species is presented. F.O.S.

**N69-31352\*#** Naval School of Aviation Medicine, Pensacola, Fla.  
**BIOTELEMETRY OF THE TRIAXIAL**

**BALLISTOCARDIOGRAM AND ELECTROCARDIOGRAM IN  
 A WEIGHTLESS ENVIRONMENT**

W. Carroll Hixson and Dietrich E. Beischer 8 Sep. 1964 98 p refs /ts Monograph No. 10

(NASA ORDER R-20)

(NASA-CR-103320) Avail: CFSTI CSCL 06B

The report describes in detail the design and development of the constraint platform with attached biotelemetry module used to transduce, signal condition, and telemeter the physiological measurements. A similar description is given of the airborne receiving station used to receive, display, and store the telemetered data. Linear and angular acceleration measurements were performed with this equipment and the results represent the first recording of a triaxial inertial acceleration ballistocardiogram. Triaxial

electrocardiographic data were simultaneously measured and telemetered to permit correlation of the mechanical and electrical events of the cardiac complex. The linear acceleration patterns were also displayed in loop form and in a three-dimensional arrangement to facilitate interpretation of their spatial relationship. Analog computer operations were performed on the flight data to obtain a continuous trace of the absolute magnitude of the instantaneous BCG and ECG vector. Differences between the flight BCG and the laboratory based BCG data are noted and discussed. Author

**N69-31356\*#** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

**COORDINATION OF THE VOLUNTARY MOVEMENTS OF MAN IN A ZERO GRAVITATIONAL FIELD (UNDER WEIGHTLESSNESS) [KOORDINATSIYA PROIZVOL'NYKH DVIZHENIY CHELOVEKA V NULEVOM GRAVITATSIONNOM POLE (V NEVESOMOSTI)]**

L. V. Chkhaidze Washington NASA Jul. 1969 34 p Transl. into ENGLISH of the book "Koordinatsiya Proizvol'nykh Dvizheniy Cheloveka v Usloviyakh Kosmicheskogo Poleta" Moscow, Nauka Press, 2d. ed., 1966

(Contract NASw-1692)

(NASA-TT-F-578) Avail: CFSTI CSCL 06S

The coordination of the voluntary movements of man in a zero gravitational field (weightlessness) is analyzed on the basis of observational data accumulated under conditions of temporary weightlessness and in flights of artificial manned satellites. The general biomechanical rules of movements performed under weightlessness conditions are derived from tests carried out according to cyclographic method. The discussions regarding coordination during weightlessness are supplemented by the personal reports of Soviet cosmonauts, as well as the American astronaut John Glenn. It is concluded that even prolonged weightlessness causes no serious or lasting disorders in an individual's movement coordination if he has been properly and adequately trained. However, certain changes should be expected in the dimensionality of the dynamic components of the coordination structure of skills performed in an altered gravitational field, and the limits to the decrease of the elements of the movement structure can reach 50%. Author

**N69-31373#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

**CONSTRUCTION AND OPTIMIZATION OF ALGORITHMS OF RECOGNITION OF RELATION**

L. M. Fridman Jul. 1968 24 p refs Transl. into ENGLISH from Programirovanoe Obuchenie i Obuchayushchie Mashiny (USSR), no. 1, 1966 p 3-21

(AD-682408; FTD-MT-24-197-68) Avail: CFSTI CSCL 5/9

The problem of recognition whether or not the test object is in a given relation with a definite pattern is theoretically examined; examples: Is this parallelogram a square. Is this letter k. A method of writing this problem in mathematical symbols is suggested. In a determinate problem, the solution algorithm is based on a set of indicants A sub k which serves as a logical definition. This definition meets these two conditions: (1) The generic concept used in the definition indicates the relation (set A); (2) The specific indicants (A sub k) are actually verifiable. This definition is written down by means of logic symbols and a corresponding graph, which is treated as the sought-for algorithm, is constructed. The programed learning includes a preliminary study of all kindred recognition problems and finding the optimal algorithm for which a quantitative evaluation is needed. TAB

**N69-31389\*#** IIT Research Inst., Chicago, Ill.

**LIFE IN EXTRATERRESTRIAL ENVIRONMENTS Final Report, 16 Feb. 1968-14 Jul. 1969**

Charles A. Hagen 15 Jul. 1969 24 p refs

(Contract NASr-22)

(NASA-CR-103319; IITRI-L6023-18) Avail: CFSTI CSCL 06C

A chamber was constructed to simulate Martian dust storms and to study the survival of airborne microorganisms exposed to a simulated Martian environment that included ultraviolet irradiation and daily freeze-thaw temperatures. The percent survivors of organisms exposed to ultraviolet radiation were equal to or greater than the nonirradiated organisms, suggesting that some factors, probably the soil particles, protected the organisms from ultraviolet irradiation. Salt tolerant, facultative anaerobes were isolated from desert, tundra, and temperate climate soils. All of the salt tolerant isolates, which included *Bacillus* and *Coccus* species, survived in a simulated Martian environment. The organisms that grew in the simulated Martian environment were chiefly isolates from desert and tundra soils, which implied that growth was more related to the native environment of the organism. Author

**N69-31401\*#** Israel Program for Scientific Translations, Ltd., Jerusalem.

**THE OXYGEN REGIME OF THE ORGANISM AND ITS REGULATION (SYMPOSIUM)**

N. V. Lauer ed. and A. Z. Kolchinskaya ed. 1969 372 p refs Transl. into ENGLISH of the book "Kislorodnyi Rezhim Organizma I Ego Regulirovanie (Materialy Simpoziuma)" Kiev, Naukova Dumka, 1966 Published for NASA and NSF /ts IPST Cat. No. 5275

(NASA-TT-F-501; TT68-50302) Copyright. Avail: CFSTI CSCL 06P

Presented are various studies of respiration and its regulation. Evaluated are the effects of breathing, circulation, and oxygen metabolism in the organism and the role of oxygen parameters in the regulation of autonomic functions governing the gas exchange. For individual titles, see N69-31401 through N69-31444.

**N69-31402\*#** Israel Program for Scientific Translations, Ltd., Jerusalem.

**RESPIRATION AND THE ORGANISM OF THE BODY [O KISLORODNOM REZHIME ORGANIZMA]**

N. V. Lauer et al. In its The Oxygen Regime of the Organism and its Regulation (Symp.) 1969 p 1-13 (See N69-31401 17-04)

Copyright. Avail: CFSTI CSCL 06P

Reviewed are the various contributions to the theory of reflex and humoral control of respiration and circulation in the human body. Discussed are the fine anatomical and functional interrelationships between the central and peripheral nervous structures participating in the control of these physiological functions, as well as data concerning the effects of chemical agents, including oxygen and carbon dioxide, upon the central and peripheral nervous structures. The high degree of coordination of the activity of the various systems suggests the presence in the body of a single system controlling the uptake of oxygen by lungs, alveoli, and blood, oxygen transport by arterial blood, oxygen supply in accordance with the body's energy requirements, and elimination of metabolic carbon dioxide. Several possibilities for the transmission and control of oxygen supplies to the various body systems are depicted and possible mathematical control models are derived. G.G.

**N69-31403\*#** Israel Program for Scientific Translations, Ltd., Jerusalem.

**CALCULATION OF RESPIRATORY INDEXES AND CONSTRUCTION OF OVERALL OXYGEN GRADIENTS [RASCHETY PARAMETROV KISLORODNYKH REZHIMOV ORGANIZMA I POSTROENIE KISLORODNYKH KASKADOV]**



N. V. Lauer et al. *In its* The Oxygen Regime of the Organism and its Regulation (Symp.) 1969 p 14-18 (See N69-31401 17-04)  
Copyright. Avail: CFSTI CSCL 06P

Outlined are physicochemical and biochemical processes of the body's oxygen regime that maintain equilibrium between the requirements of the tissues for oxygen and its supply. Emphasis is placed on oxygen partial pressure gradients maintained at different stages of its progress through the body and the relationships between the demands of the tissues for oxygen and its supply. The respiratory control center coordinates this variety of mechanisms in order to maintain oxygen parameters at optimal level over the entire path of oxygen through the body. The rate of oxygen consumption in tissues depends on their conditions, on neurohormonal control over processes occurring at tissue, cellular, and molecular levels, and on the oxygen parameters of arterial and venous blood. Respiratory efficiency is subject to oxygen quantity utilized, oxygen pressure levels and gradients at each stage of the respiratory control center, and the relationship between the work done at each functional system and the quantity of oxygen consumed by the body. These indexes represent the economy of the overall oxygen regime in its separate stages and of the roles played by breathing, circulation, and red blood corpuscles in controlling the respiratory system.

G.G.

**N69-31404\*#** Israel Program for Scientific Translations, Ltd., Jerusalem

**TRANSIENT PROCESSES AT THE FIRST STAGE OF THE BODY'S RESPIRATORY CONTROL SYSTEM [K VOPROSU O PEREKHODNYKH PROTSESSAKH V PERVOM ZVENE SISTEMY REGULIROVANIYA KISLORODNYKH REZHIMOV ORGANIZMA]**

E. A. Shkabara *In its* The Oxygen Regime of the Organism and its Regulation (Symp.) 1969 p 19-22 (See N69-31401 17-04)  
Copyright. Avail: CFSTI CSCL 06P

A mathematical description is developed for the transient processes at the first stage of the body's respiratory control system. The oxygen content of the external air entering the pulmonary reservoir is determined by partial pressure and the volume of air entering the lungs per minute and the oxygen content of the alveolar air at the output of the first stage is represented in parameters. The mathematical relationship between the input and the output and the static characteristics of oxygen content in alveolar air as a function of its content are described by linear equations. Variations in respiratory rate and volumes then transfer the linear differential equation into a nonlinear one where the time and gain coefficients become variables dependent upon the time variation of oxygen content in alveolar air.

G.G.

**N69-31405\*#** Israel Program for Scientific Translations, Ltd., Jerusalem

**ASSESSMENTS OF ACCURACY IN CALCULATIONS OF RESPIRATORY INDEXES [OTSENKI TOCHNOSTI RASCHETOV PARAMETROV KISLORODNOGO REZHIMA ORGANIZMA]**

N. A. Kulikov *In its* The Oxygen Regime of the Organism and its Regulation (Symp.) 1969 p 23-39 refs (See N69-31401 17-04)

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Maximum errors in respiratory indexes were calculated by considering the following: (1) normal error distribution due to time variation of the measured quantity; (2) equal accuracy degree for all measurements; (3) independence and uniform distribution of measurement error for single measurements; and (4) mutual independence of both total error components. The total error component was diminished by increasing the number of determinations. The maximum relative error for gas concentration measurements in air depended upon the determined quantity and

the number of consecutive observations necessary to keep the total relative error within 5%.

G.G.

**N69-31406\*#** Israel Program for Scientific Translations, Ltd., Jerusalem

**AN AUTOMATIC MODEL OF THE RESPIRATORY CONTROL SYSTEM [AVTOMATICHESKAYA MODEL' SISTEMY REGULIROVANIYA KISLORODNOGO REZHIMA ORGANIZMA]**

A. N. Medelyanovskii et al. *In its* The Oxygen Regime of the Organism and its Regulation (Symp.) 1969 p 40-49 (See N69-31401 17-04)

Copyright. Avail: CFSTI CSCL 06P

Cybernetic application of the feedback principle, utilizing deviations of an internal environment index for controlling the correction of this deviation, is proposed for an automatic maintenance system model of respiratory control. A complex network of feedback connections, in which combinations of receptor and effector elements constitute intertwining control circuits of various physiological parameters, is presented graphically. The system uses the following types of feedback for gas-jet phase shifts: (1) feedback for regulating internal environment parameters; (2) feedback for stepwise switching of body systems in connection with deviations of controlled parameters; (3) feedback connections for the optimization of preset parameter levels; and (4) effector-to-receptor feedbacks to eliminate control inconsistencies.

G.G.

**N69-31407\*#** Israel Program for Scientific Translations, Ltd., Jerusalem

**A MATHEMATICAL APPROACH TO THE INVESTIGATION OF ENERGY CONSUMPTION BY ACTIVE HUMAN BEINGS IN ENCLOSED SPACES [MATEMATICHESKII PODKHOD K IZUCHENIYU DINAMIKI ENERGOTRAT CHELOVEKA V ZAMKNUTOM OBEME]**

V. K. Vasilev et al. *In its* The Oxygen Regime of the Organism and its Regulation (Symp.) 1969 p 50-53 (See N69-31401 17-04)

Copyright. Avail: CFSTI CSCL 06P

Developed is a theoretical model for continuous determination of human gas exchange dynamics in enclosed chambers. Correlation between the variable human gas exchange parameters and the stabilized physical environment involves the determination of gas exchange equations. Linear control theory is used to express this relationship through convolutional integrals. Example calculations analyze the oxygen consumption dynamics of a man in a flow type airtight environmental chamber.

G.G.

**N69-31408\*#** Israel Program for Scientific Translations, Ltd., Jerusalem

**AN ANALYSIS OF RESPIRATORY TRANSFORMATION MECHANISMS OCCURRING DURING FETAL GROWTH [K ANALIZU NEKOTORYKH MEKHANIZMOV PREOBRAZOVANIYA KISLORODNOGO REZHIMA V PROTSESSE ONTOGENEZA]**

I. A. Arshavskii *In its* The Oxygen Regime of the Organism and its Regulation (Symp.) 1969 p 54-63 (See N69-31401 17-04)

Copyright. Avail: CFSTI CSCL 06P

Long term effects of maternal oxygen deficiency upon the growth and development of rabbit fetuses were studied. Pregnant rabbits were exposed daily for 2 hours to a rarefied altitude. Towards the end of pregnancy exposed fetuses reached a weight of 80 to 94g instead of the normal 35 to 50g. High respiratory intensity observed at the early age coexisted with adrenergic features of homeostasis. The relative size of oxygen systems in the

newborne larger animals of nearly double normal weight was attributed to strain effects on the respiratory and cardiovascular systems due to maternal hypoxemia. G.G.

**N69-31409\*#** Israel Program for Scientific Translations, Ltd., Jerusalem.

**THE ROLE OF BREATHING IN RESPIRATORY CONTROL [O ROLI VNESHNEGO DYKHANIYA V REGULIROVANII KISLORODNOGO REZHIMA ORGANIZMA]**

M. M. Seredenko *In its* The Oxygen Regime of the Organism and its Regulation (Symp.) 1969 p 64-69 (See N69-31401 17-04)  
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Described are experimental hypoxia and aging models that assess the role of breathing in respiratory control during a lifetime. The largest quantity of oxygen entering the alveoli per minute occurs in middle aged subjects and efficiency indexes of that group indicate the highest levels. This efficiency is somewhat lower in young adults and still lower in children and elderly subjects. G.G.

**N69-31410\*#** Israel Program for Scientific Translations, Ltd., Jerusalem.

**ARTERIAL, VENOUS, AND TISSUE RECEPTORS AND THE CONTROL OF BREATHING DURING HYPOXIA [OB UCHASTII ARTERIALNYKH, VENOZNYKH I TKANEVYKH RETSEPTOROV V REGULYATSII VNESHNEGO DYKHANIYA PRI GIPOKSII]**

L. I. Ardashnikova *In its* The Oxygen Regime of the Organism and its Regulation (Symp.) 1969 p 70-74 (See N69-31401 17-04)  
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Chemoreceptors of the cardioaortic and sinocarotid regions were stimulated by the partial oxygen pressure of the arterial blood; respiration was only affected at low oxygen pressures. Intensified respiration during prolonged hypoxia was not related to chemoreceptor stimulation. It was concluded that the role of pulmonary arterial receptors in external respiration control is not clearly understood. In the case of hypoxic hypoxia, the primary phenomenon was the decrease of partial oxygen pressure in arterial and venous blood. However, after denervation of the carotid and cardioaortic zones, respiration did not intensify after abrupt oxygen pressure reduction in the inspired air. G.G.

**N69-31411\*#** Israel Program for Scientific Translations, Ltd., Jerusalem.

**THE REACTIONS OF BREATHING AND MYOCARDIAL TISSUE TO HYPOXEMIC TEST CONDITIONS [REAKTSIYA VNESHNEGO DYKHANIYA I MIOKARDA NA GIPOKSEMICHESKUYU PROBU]**

A. G. Dembo et al *In its* The Oxygen Regime of the Organism and its Regulation (Symp.) 1969 p 75-79 (See N69-31401 17-04)

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Reactions of breathing and myocardial tissue to reduced oxygenation of arterial blood were studied on 102 young, highly qualified and experienced athletes and, for comparison, on 17 healthy nonathletes. The oxygenation of arterial blood was artificially reduced in the following four ways: (1) by inhibition of respiration; (2) by reverse respiration; (3) by inspiration of mixtures containing 10.3%-10.5% oxygen; and (4) by inspiration of 14%-15% oxygen mixtures. In all cases the concentration of carbon dioxide under the bell jar at the end of the experiment did not exceed 0.2%-0.3%, due to lime absorption. Arterial oxygenation was determined with an oxymograph. Saturation was held above 65%-70% to avoid possible significant alteration in the central nervous system. Studies were also made of the reactions of breathing, viz., absorption of oxygen per min, respiration depth and

rate, respiratory minute volume (RMV), and the coefficient of oxygen utilization, with both the ECG and vector-cardiogram. It was found that the duration of reverse respiration, breath holding, and respiration of gaseous mixtures with low oxygen concentration do not, in themselves, determine the degree of arterial hypoxemia, since the time of occurrence of arterial hypoxemia is an individual trait. Author

**N69-31412\*#** Israel Program for Scientific Translations, Ltd., Jerusalem.

**THE ROLE OF THE CHEMORECEPTORS OF THE CAROTID BODIES IN PULMONARY RESPIRATION CONTROL [O ROLI KHEMORETSEPTOROV KAROTIDNYKH KLUBOCHKOV V REGULYATSII LEGOCHNOGO DYKHANIYA]**

S. S. Krylov *In its* The Oxygen Regime of the Organism and its Regulation (Symp.) 1969 p 80-82 (See N69-31401 17-04)  
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Among the body's interoceptor devices are the chemoreceptors of the carotid reflexogenic zone located in the carotid bodies which stimulate the respiration. When the carotid bodies are disconnected by removing a section of the sinus nerve or by extirpation of the carotid body, an untrained subject cannot react to hypoxia by stimulation of the pulmonary respiration and the hypoxia inhibits the subject's general condition. Characteristic of the hypoxic stimulation of carotid chemoreceptors is its marked inertia. It is concluded that hypoxic stimulation of the carotid bodies provides specialized information to the central nervous system concerning decreased oxygen tension in the blood. G.G.

**N69-31413\*#** Israel Program for Scientific Translations, Ltd., Jerusalem.

**OXYGEN REQUIREMENTS AND CIRCULATION [KISLORODNYI ZAPROS I KROVOOBRASHCHENIE]**

L. L. Shik *In its* The Oxygen Regime of the Organism and its Regulation (Symp.) 1969 p 83-87 (See N69-31401 17-04)  
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Discussed is the relationship between oxygen requirement and circulation controls which maintains the constant level of arterial pressure and effects the vascular peripheral resistance in every organ, primarily in accordance with its own oxygen requirements. Since levels of arterial pressures are related to local control of the blood flow in different organs, a central circulation control is ruled out. Pulmonary minute volume circulation in patients with ductus arteriosis, defective septum atrium, or septum ventriculorum cordis doubled and often trebled the normal quantity. Circulatory minute volume is maintained even in severe aortic stenosis, despite very pronounced pressure changes in the cardiac cavities. G.G.

**N69-31414\*#** Israel Program for Scientific Translations, Ltd., Jerusalem.

**AGE-CONDITIONED CHANGES IN BLOOD CIRCULATION AND RESPIRATORY CONTROL [O ZNACHENII VOZRASTNYKH IZMENENII GEMODINAMIKI V REGULIROVANII KISLORODNOGO REZHIMA ORGANIZMA]**

M. M. Koganovskaya *In its* The Oxygen Regime of the Organism and its Regulation (Symp.) 1969 p 88-94 (See N69-31401 17-04)

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The quantity of oxygen supplied to the tissues by the bloodstream per unit time depends, in the main, upon the circulatory minute volume. A comparison was made of the oxygen reserves of circulatory minute volumes in animals of different age groups. In normal puppies aged 2-3 weeks, the quantity of oxygen delivered by arterial blood per kg body weight per min is larger than in animals. This is so despite the comparatively small oxygen capacity

of the blood and the comparatively low oxygen concentration in the arterial blood. The same was found for puppies at the age of puberty. On the other hand, the quantity of oxygen delivered to the tissues by arterial blood per min in old dogs is considerably smaller than it is in middle-aged dogs. This results from the comparatively small circulation volume of old dogs. Author

**N69-31415\*#** Israel Program for Scientific Translations, Ltd Jerusalem.

**CHANGES IN THE BLOOD CIRCULATION DURING RESPIRATORY VARIATIONS AND REGIONAL CIRCULATION [GEMODINAMICHESKIE SDVIGI I REGIONARNOE KROVOBRASHCHENIE PRI IZMENENIYAKH KISLORODNOGO REZHIMA ORGANIZMA]**  
N. I. Gurevich et al. *In its* The Oxygen Regime of the Organism and its Regulation (Symp.) 1969 p 95-101 (See N69-31401 17-04)

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The processes of circulation control during hypoxic states were studied on cats. After breathing a gaseous mixture containing 9.6% oxygen for 5 to 10 minutes, the circulatory minute volume of the cats was reduced; their arterial pressure remained slightly elevated for some time due to increased general peripheral vascular resistance. In hypoxic hypoxia different tissues differed with respect to oxygen supply; oxygen tension decreased in the skeletal muscles and the skin steadily whereas the cerebral cortex oxygen tension remained at a fairly constant level after an initial slight decrease. The optimal blood oxygen supply to the most important organs during hypoxia involved a redistribution of blood throughout the body. G.G.

**N69-31416\*#** Israel Program for Scientific Translations, Ltd., Jerusalem.

**OXYGEN RESERVES IN ANIMALS AND MAN [PROBLEMA REZERVOV KISLORODA V ORGANIZME ZHIVOTNYKH I CHELOVEKA]**

P. A. Korzhuev *In its* The Oxygen Regime of the Organism and its Regulation (Symp.) 1969 p 102-106 (See N69-31401 17-04)

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A comparison of oxygen consumption intensity by cells and tissues of man and different animals revealed that consumption per unit mass was the same in all animals, irrespective of their phylogenetic position; these levels rose only in homoiothermic animals, but were also constant in all homiotherms. The greater increase of oxygen supply capacity in terrestrial vertebrates was related to their aeration organs which together with larger oxygen delivery mechanisms produced larger quantities of blood and hemoglobin. G.G.

**N69-31417\*#** Israel Program for Scientific Translations, Ltd., Jerusalem.

**THE CONTROL OF OXYGEN RELEASE BY THE ERYTHROCYTES [O REGULIROVANII OTDACHI KISLORODA ERITROTSITAMI]**

F. I. Gimmerikh *In its* The Oxygen Regime of the Organism and its Regulation (Symp.) 1969 p 107-112 (See N69-31401 17-04)

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Formulated is a working hypothesis according to which glycolysis in erythrocytes intensifies the effects of differences in partial pressures of blood oxygen transport. Addition of erythrocytes washed free of glucose to unwashed erythrocytes markedly increased oxygen release; this reaction is not effective when

glycolysis was prevented by sodium fluoride or by hemolysis of the erythrocytes. Experiments at different pH values clearly demonstrate that erythrocytic oxygen release during glycolysis is intensified by an increase in the pH of the blood plasma. Observations on human subjects and rabbits also demonstrate that the energy of hemoglycolysis increased by injections of insulin and diminished by injections of adrenaline. It is concluded that the endocrine system is the controlling factor in oxygen release by erythrocytes. G.G.

**N69-31418\*#** Israel Program for Scientific Translations, Ltd., Jerusalem.

**THE ERYTHROCYTIC SYSTEM AND RESPIRATORY CONTROL [O ROLI ERITROTSITARNOI SISTEMY V REGULVATSII KISLORODNOGO REZHIMA ORGANIZMA]**

Yu. V. Semenov *In its* The Oxygen Regime of the Organism and its Regulation (Symp.) 1969 p 113-118 (See N69-31401 17-04)

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The erythrocytic system possesses the capacity for altering the oxygen-fixing function of circulating blood in accordance with oxygen requirements of the tissues. This function is limited by the magnitude of the surface area and the oxygen-fixing activity of the erythrocytes. The oxygen-fixing capacity thus depends on the degree of affinity of corpuscular hemoglobin for oxygen and the oxygen capacity of the red blood cells. Other mechanisms controlling the oxygen-fixing properties of the blood operate at cellular and molecular levels. Experimental data on the oxygen transporting function of the erythrocytic system and the blood circulation on hypoxic dogs demonstrate that during the development of acute hypoxia the mean hemoglobin content of an erythrocyte decreases, but the hemoglobin concentration remains unchanged. This suggests that the body possesses a mechanism for selective deposition of small erythrocytes. G.G.

**N69-31419\*#** Israel Program for Scientific Translations, Ltd., Jerusalem.

**MECHANISMS CONTROLLING THE RESPIRATORY SURFACE OF BLOOD IN CONNECTION WITH OXYGEN DEFICIENCY [NEKOTORYE MEKHANIZMY REGULYATSII DYKHATELNOI POVERKHNOSTI KROVI V SVYAZI S KISLORODNOI NEDOSTATOCNOSTYU]**

L. G. Gorozhanin *In its* The Oxygen Regime of the Organism and its Regulation (Symp.) 1969 p 119-124 (See N69-31401 17-04)

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Examined was the participation of chemoreceptors, the sinocarotid zone, and of the spleen in the mechanism of blood redistribution and erythropoiesis in hypoxic dogs. Observed were erythrocytosis, reticulocytosis without alteration of the differential count, and increased blood circulation volume with increased numbers of circulating erythrocytes. Dogs with denervated carotid sinuses responded to brief oxygen starvation similar to intact animals; however, after termination of acute hypoxia, restoration of peripheral blood parameters lagged 30 to 60 minutes behind that of intact dogs. Splenectomized dogs lacked the acute erythrocyte reaction to hypoxia and displayed disturbances in their hematopoietic reactions. The absence of erythrocytosis in splenectomized hypoxic animals is explained by the normal erythrocyte concentration in their spleens. G.G.

**N69-31420\*#** Israel Program for Scientific Translations, Ltd., Jerusalem.

**ADAPTIVE ALTERATIONS OF OXYGEN TRANSPORT IN CELL CYTOPLASMA AND MITOCHONDRIA [PRISOSOBITELNYE IZMENENIYA TRANSPORTA KISLORODA V KLETOCHNOI TSITOPLAZME I MITOKHONDRIYAKH]**

Z. I. Barbashova *In its* The Oxygen Regime of the Organism and its Regulation (Symp.) 1969 p 125-132 (See N69-31401 17-04)

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The principal motive force causing oxygen to pass from the capillary blood into the cell and its mitochondria is the difference in the partial pressures of molecular oxygen between the capillary, the cell, and the mitochondria. The quantity of transported oxygen does not depend solely upon the diffusion gradient at the blood/tissue interface but also upon the following factors: (1) the quantity of blood flowing through the tissues; (2) the rate of the blood flow through tissue capillaries; (3) the oxygen capacity of blood; (4) the oxygen-fixing properties of hemoglobin; (5) the activity of the enzyme globin oxidase; (6) the pH of blood and its concentration of  $\text{CO}_2$ ; (7) the activity of certain blood enzymes; (8) the ambient temperature; and (9) the salt concentration. All the above conditions, as well as several other factors, cause release of 30%–35% of the oxygen held in the oxyhemoglobin under conditions of rest. Adaptive alterations of oxygen transport in tissues depend on enzymatic activities and myoglobin concentrations in the muscles which in turn are very much influenced by the sympathetic nervous system. Author

**N69-31421\*#** Israel Program for Scientific Translations, Ltd., Jerusalem.

**THE THEORY OF OXYGEN DYNAMICS IN TISSUES [O TEORII DINAMIKI KISLORODA V TKANYAKH]**

E. A. Kovalenko *In its* The Oxygen Regime of the Organism and its Regulation (Symp.) 1969 p 133–148 (See N69-31401 17-04)

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Reported are theoretical calculations and mathematical models of diffusion processes involved in oxygen delivery to living tissues. The path of oxygen penetration into the body is represented as a continuously descending gradient of the partial pressure of oxygen in the alveoli, in the arterial, capillary, and venous blood, and in the tissues. The diffusion forces depend upon the Brownian motion of molecules and are expressed in a theory of oxygen diffusion according to which the process is conditioned by the physical properties of the gas and the gradient of its partial pressures. Example calculations on oxygen diffusion in a tissue cylinder model as an oxygen delivery scheme, together with the oxygen-cerebral tissue hypothesis are used to evaluate experimental data of cerebral oxygenation of animals. G.G.

**N69-31422\*#** Israel Program for Scientific Translations, Ltd., Jerusalem.

**EFFECT OF OXYGEN-STARVATION ON THE METABOLISM OF PHOSPHOLIPIDS IN THE CEREBRUM [VLIYANIE KISLORODNOGO GOLODANIYA NA OBMEN FOSFOLIPIDOV V GOLOVNOY MOZGU]**

S. V. Gasteva et al *In its* The Oxygen Regime of the Organism and its Regulation (Symp.) 1969 p 149–153 (See N69-31401 17-04)

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The effect of oxygen starvation on the metabolism of phospholipids in the central nervous system was studied by determining the metabolic changes and the inhibiting effect of hypoxia on metabolic processes in the CNS tissue. Albino rats of the Wistar strain were severely affected by hypoxia at barometric pressures of 180–140 mm Hg and showed a 40% lethality after 2 hrs. Total phospholipid and phospholipid fraction assessments on decapitated rats and metabolic activity assessments of the phosphate group of the phospholipids from the incorporation rate of radioactive orthophosphate showed a statistically significant ( $P < 0.001$ ) specific radioactivity of the cerebral phospholipids; this specific radioactivity was dependent upon body temperature and

independent of the rarefaction of the gases in the chamber ( $P > 0.10$ ). It was concluded that variations in cerebral tissue metabolism and decreased phospholipid metabolic intensity were caused by several adaptive mechanisms which switched the functioning of these systems to different levels. G.G.

**N69-31423\*#** Israel Program for Scientific Translations, Ltd., Jerusalem.

**MECHANISMS OF THE REDOX PROCESS DISTURBANCE IN EXPERIMENTAL MYOCARDIAL INFRACTION [NEKOTORYE MEKHANIZMY NARUSHENIYA OKISLITELNOVOSTANOVITELNYKH PROTSESSOV PRI EKSPERIMENTALNOM INFARKTE NIOKARDE]**

B. M. Shargorodskii et al *In its* The Oxygen Regime of the Organism and its Regulation (Symp.) 1969 p 154–157 (See N69-31401 17-04)

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The dynamics of oxidation process disturbances in experimental myocardial infraction were studied through the redox potential of both the composite and the individual redox systems; the redox potential was determined from the concentration ratios of oxidized and reduced tissues in the heart. Data indicated that the following features caused disturbances in heart respiration during acute myocardial infraction: (1) different mechanisms responsible for lowering of the redox potential at different intervals, and (2) disturbances due to conditions preventing the manifestation of the catalytic enzyme properties. G.G.

**N69-31424\*#** Israel Program for Scientific Translations, Ltd., Jerusalem.

**AGE-CONDITIONED FEATURES OF OXIDATION PROCESSES IN THE HEART AND THEIR CONTROL [VOZRASTNYE OSOBENNOSTI OKISLITELNYKH PROTSESSOV V SERDTSE I IKH REGULYATSIYA]**

V. V. Frolkis et al *In its* The Oxygen Regime of the Organism and its Regulation (Symp.) 1969 p 158–164 (See N69-31401 17-04)

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Analyzed is the significant decrease in the intensity of the endogenous myocardial respiration with advancing age by evaluating the possible mechanisms reducing the oxygen consumption in tissues: (1) the age conditioned decrease in the number of actively respiring cell elements; and (2) the age conditioned fundamental alterations in the different links of the oxidation processes, reducing the respiratory intensity. Since all processes of cell respiration and the liberation of energy are related to mitochondria it is assumed that a decrease in the number of mitochondria in the heart is one of the main causes of low cardiac tissue respiration. Animal studies also show that the activities of the various enzymatic processes in heart mitochondria undergo age conditioned changes. One of the important limiting factors of myocardial respiration in old age is the decrease in cytochrome oxidase activity and thus effects the electron chain transfer in biological tissue oxidation. G.G.

**N69-31425\*#** Israel Program for Scientific Translations, Ltd., Jerusalem.

**EFFECT OF THE RESPIRATORY PHOSPHORYLATION INHIBITOR 2,4-DINITROPHENOL UPON THE CONSUMPTION OF OXYGEN BY MUSCULAR TISSUE [VLIYANIE INHIBITORA DYKHATELNOGO FOSFORILIROVANIYA  $\alpha$ , 2,4-DINITROFENOLA NA POTREBLENIE KISLORODA NYSHECHNOI TKANYU]**

T. A. Popov et al. *In its* The Oxygen Regime of the Organism and its Regulation (Symp.) 1969 p 165-167 (See N69-31401 17-04)

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Investigated was the compound 2,4-dinitrophenol (DNP) as an inhibitor of oxidation by phosphorylation on albino rats. The animals received either peroral administration of aqueous DNP solution with concentrations of  $1/20 \text{ LD}_{50} = 1.5 \text{ mg/kg}$  for 80 days or the same dose at the day of experiment. The oxygen consumption rate was determined by means of oxygen load and respiration in muscular tissues was recorded by polarographic apparatus. An analysis of obtained data showed that a single administration of DNP caused a considerable decrease in the oxygen saturation of the muscles; the consumption of oxygen was increased. The first experimental group exhibited the cumulative effects of DNP. Thus, it was concluded that peroral administration of DNP increased the consumption of oxygen by muscular tissues.

G.G.

**N69-31426\*#** Israel Program for Scientific Translations, Ltd., Jerusalem.

**CONTROL OF OXYGEN CONSUMPTION IN HEALTHY AND ILL PERSONS [K VOPROSU O REGULIROVANII POTREBLENIIA KISLORODA V ORGANIZME ZDOROVOGO I BOLNOGO CHELVEKA]**

E. N. Domontovich et al. *In its* The Oxygen Regime of the Organism and Its Regulation (Symp.) 1969 p 168-171 (See N69-31401 17-04)

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Breathing and circulatory responses of healthy subjects and of patients suffering from tuberculosis were studied in order to determine their oxygen consumption. Results revealed a disruption of oxygen control in sick subjects. This malfunction was not only attributed to the state of the respiratory and circulatory systems, but also to that of the self-regulatory system controlling oxidation processes.

G.G.

**N69-31427\*#** Israel Program for Scientific Translations, Ltd., Jerusalem.

**RESPIRATION OF THE BRAIN AT RAISED INTRACRANIAL PRESSURE [KISLORODNYI REZHIM MOZGA PRI POVYSHENNOM VNUTRICHREPNOM DAVLENII]**

E. A. Ilin *In its* The Oxygen Regime of the Organism and Its Regulation (Symp.) 1969 p 172-175 (See N69-31401 17-04)

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Studied was the respiration of the brain at different intracranial pressures in order to determine those pressures that give rise to cerebral hypoxia due to inadequate cerebral circulation. The intracranial pressure of rabbits was raised by pumping a physiological solution into the subdural space over the cerebral cortex or into the cerebellomedullary cistern. Brain respiration at raised intracranial pressure was studied by polarographic determinations of the partial oxygen pressure. Results showed that intracranial pressure of 270 mm water and above disturbed the cerebral respiration. Breathing of 100% oxygen at intracranial pressure up to 540 mm water effectively restored disturbed cerebral respiration. Mechanical irritation of the dura mater and irradiation and damage to the trigeminal ganglion and section of the root of the fifth cranial nerve caused a decrease in partial oxygen pressure in the cerebral cortex.

G.G.

**N69-31428\*#** Israel Program for Scientific Translations, Ltd., Jerusalem.

**PHYSIOLOGICAL MECHANISMS OF CHANGES IN OXYGEN CONSUMPTION AND BODY TEMPERATURE IN HYPOXIA**

**[FIZIOLOGICHESKIE MEKHANIZMY IZMENENII POTREBLENIIA KISLORODA I TEMPERATURY TELA PRI GIPOKSII]**

K. P. Ivanov *In its* The Oxygen Regime of the Organism and Its Regulation (Symp.) 1969 p 176-180 (See N69-31401 17-04)

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The inhibition of controlled gas exchange in the form of chemical thermoregulation by hypoxia was studied by observing variations in shivering and thermoregulatory tone as well as variations in body temperature and gas exchange of different animals. In rates, decompression caused a decrease in the electrical activity of the muscles parallel with the decrease in body temperature. Preliminary cooling of the animals increased gas exchange nearly threefold and hypoxia caused a return of the oxygen consumption almost to its initial level. It was concluded that hypoxia specifically inhibited the physiological mechanism of the body's temperature homeostasis.

G.G.

**N69-31429\*#** Israel Program for Scientific Translations, Ltd., Jerusalem.

**MAXIMUM OXYGEN CONSUMPTION AND FUNCTIONAL STATE OF THE CIRCULATION IN SIMULATED ZERO GRAVITY [MAKSIMALNOE POTREBLENIE KISLORODA I FUNKSIONALNOE SOSTOYANIE KROVOOBRASHCHENIYA PRI IMITATSII NEVESOMOSTI]**

V. S. Georgievskii et al. *In its* The Oxygen Regime of the Organism and Its Regulation (Symp.) 1969 p 181-184 (See N69-31401 17-04)

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Elucidated were the effects of prolonged, strict bed rest on a subject's consistency of working at maximum intensity. Tests involved increasing physical loads before and after the stay in bed. In bicycle ergometer tests several respiratory and circulatory indexes were recorded in addition to work performed, oxygen consumption, and pulse rate. Experimental data revealed diminishing muscular activity following restriction of motor activity in all subjects. Although the maximum amount of work performed did not reach the normal level, the capacity for increasing energy production during increased duration of muscular work was retained. Performance of the same work following bed rest with restricted motor activity made severe demands on the cardiovascular system which in turn brought the circulation to its initial level.

G.G.

**N69-31430\*#** Israel Program for Scientific Translations, Ltd., Jerusalem.

**PROBLEMS OF HYPOXIA IN SPORTS MEDICINE [PROBLEMY GIPOKSII V SPORTIVNOI MEDITSINE]**

S. P. Letunov *In its* The Oxygen Regime of the Organism and Its Regulation (Symp.) 1969 p 185-194 (See N69-31401 17-04)

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An experimental model of strenuous muscular work, combined with artificial relative oxygen deficiency, was used to study athletic working capacity based on individual levels of reaction, stability, and resistance. The trained athlete's high working capacity was remarkable for its high resistance to hypoxic conditions caused by the stability and high intensity of his respiratory and circulatory functions during repeated muscular work. His energy supply to the motor system remained unimpaired and increased the phagocytic and enzymatic activities of the blood cells and the stability of the adrenal cortical indices.

G.G.

**N69-31431\*#** Israel Program for Scientific Translations, Ltd., Jerusalem.

**MOTOR HYPOXIA [DVIGATELNAYA GIPOKSIYA]**

A. B. Gandelsman *In its* The Oxygen Regime of the Organism and Its Regulation (Symp.) 1969 p 195-205 (See N69-31401 17-04)

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This paper elucidated the subject of hypoxic states during muscular work, their variations in relation to training, and the adaptation of athletes to hypoxia in strenuous, repetitive work. It was shown that several features distinguished motor hypoxia from other hypoxic states; it occurred in healthy people under normal atmospheric pressure, was more pronounced in trained persons with greater working capacity and against a background of high oxygen consumption. The high resistance of trained athletes to hypoxia was caused by adaptation as a result of repetitive motor hypoxia effects. Motor hypoxemia proved to include also a change of non-respiratory origin and probably involves adaptive opening of arteriovenous shunts in the pulmonary circulation, fluctuations in intrathoracic pressure, gravity effects on the blood stream, etc. G.G.

N69-31432\*# Israel Program for Scientific Translations, Ltd., Jerusalem.

**MAXIMUM OXYGEN CONSUMPTION AS AN INDEX OF THE EXTENT OF OXIDATION PROCESSES AND GENERAL WORKING CAPACITY [MAKSIMALNOE POTREBLENIE KISLORODA KAK POKAZATELOBEMA OKISLITEL'NYKH PROTSSOV I OBSHCHEI RABOTOSPOSOBNOSTI ORGAN]**  
V. S. Farfel et al *In its* The Oxygen Regime of the Organism and Its Regulation (Symp.) 1969 p 206-210 (See N69-31401 17-04)

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Maximum oxygen consumption describes the upper limit of oxidation processes available to the body, and is increased to the extreme limit by strenuous muscular work. It depends upon the active body mass, age, and sex, is little affected by mild external stimuli, and reflects very clearly the total working capacity and training. Since oxygen consumption during work of moderate output bears a linear relationship to the actual work output, a high oxygen consumption by an athlete is regarded as an index of high work output. G.G.

N69-31433\*# Israel Program for Scientific Translations, Ltd., Jerusalem.

**OXYGEN EXCHANGE IN MAN DURING MUSCULAR ACTIVITY [KISLORODNYI OBMEN U CHELOVEKA PRI MYSHECHNOI DEYATELNOSTI]**

N. I. Volkov et al *In its* The Oxygen Regime of the Organism and Its Regulation (Symp.) 1969 p 211-226 (See N69-31401 17-04)

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A kinetic model of oxygen exchange was developed and used to derive mathematical equations describing the oxygen consumption curve under various conditions. The model requires the oxygen consumption curve to follow a simple exponential relationship during moderately strenuous muscular work and a bi-exponential relationship during strenuous muscular work. A positive correlation between the kinetic constants and the rate of oxygen propagation through the metabolic space of the oxidation substrate was provided. G.G.

N69-31434\*# Israel Program for Scientific Translations, Ltd., Jerusalem.

**ROLE OF EXTERNAL RESPIRATION IN ENSURING MAXIMUM OXYGEN CONSUMPTION BY ATHLETES IN REPETITIVE MUSCULAR ACTIVITY [ROL VNESHNEGO DYKHANIYA V OBESPECHENII MAKSIMAL'NYKH VELICHIN]**

**POTREBLENIE KISLORODA U SPORTSMENOV VO UREMYA MYSHECHNOI DEYATELNOSTI TSIKLICHESKOGO TIPA]**

M. V. Mikhailov *In its* The Oxygen Regime of the Organism and Its Regulation (Symp.) 1969 p 227-230 (See N69-31401 17-04)

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The efficiency of various regimes of external respiration in athletes during muscular work of submaximal intensity was studied with emphasis on nasal and oral respiration as well as in respiration with different frequency/depth ratios. Maximum pulmonary ventilation values were found to be 2 to 2.5 times larger in oral than in nasal respiration, while maximum oxygen consumption values were found to be correspondingly 1.5 times larger. Thus, in strenuous muscular work, oxygen supply was less efficient through the nose than through the mouth. G.G.

N69-31435\*# Israel Program for Scientific Translations, Ltd., Jerusalem.

**EFFECT OF HYPOKINESIA ON HUMAN RESPIRATION IN PHYSICAL WORK [VLIYANIE GIPOKINEZII NA KISLORODNYI REZHIM CHELOVEKA PRI FIZICHESKOI RABOTE]**

B. S. Katkovskii *In its* The Oxygen Regime of the Organism and Its Regulation (Symp.) 1969 p 231-235 (See N69-31401 17-04)

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Studied were the effects of prolonged bed rest on human respiration at rest and in physical work. The latter provided a criterion for the assessment of physical work capacity. Experimental data indicated that even moderate work after prolonged hypokinesia increased the demands upon the cardiovascular, respiratory, and other systems due to lower economy and impaired control of respiration. G.G.

N69-31436\*# Israel Program for Scientific Translations, Ltd., Jerusalem.

**RELATIONSHIP OF CERTAIN OXYGEN PARAMETERS UNDER REDUCED BAROMETRIC PRESSURE AND IN ACCELERATION [VZAIMOOTNOSHENIE NEKTORYKH POKAZATELEI KISLORODNOGO REXHIMA ORGANIZMA PRI PONIZHENNOM BAROMETRICHESKOM DAVLENII I USKORENIYAKH]**

E. I. Sorokina et al *In its* The Oxygen Regime of the Organism and Its Regulation (Symp.) 1969 p 236-238 (See N69-31401 17-04)

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Assessed were the oxygen exchange parameters in various forms of hypoxia through the oxidation-reduction (redox) potential of the muscles as observed by potentiometer. Results showed that a strengthening of the influencing factor markedly decreased oxygen tension and redox potential of the muscle during hypoxia. However, as the influencing factor grew stronger, the depletion of these reserves led to a more rapid decrease in both parameters until a plateau period was reached by the rapidly increasing changes in the body's respiration. The after effect period produces a gradual recovery of the original steady-state condition. G.G.

N69-31437\*# Israel Program for Scientific Translations, Ltd., Jerusalem.

**OXYGEN TENSION IN MYOCARDIUM AND BLOOD IN CIRCULATORY AND ANEMIC HYPOXIA [NAPRYAZHENIE KISLORODA V MYSHTSE SERDTA I KROVI V USLOVIYAKH TSIRKULYATORNOI I ANEMICHESKOI GIPOKSII]**

V. I. Korolkov et al. *In its* The Oxygen Regime of the Organism and Its Regulation (Symp.) 1969 p 239-242 (See N69-31401 17-04)

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Oxygen tension in the myocardium was studied as an index of its oxygen supply in correlation with variations in hemodynamics, total gas exchange, and blood gases. Oxygen tension measurements on hypoxic dogs by implanted ventricular electrode showed that high blood loss drastically lowered arterial blood pressure and reduced minute volume to nearly 1/5 of its original value. Replacement of almost half the volume with polyglucin compensated acute anemic hypoxia and its tension in myocardium and blood. G.G.

**N69-31438\*#** Israel Program for Scientific Translations, Ltd., Jerusalem.

**ACTIVE AVOIDANCE OF HYPOXIC ENVIRONMENTS BY ANIMALS AND MAN [OB AKTIVNOM IZBEGANII ZHIVOTNYMI I CHELOVEKOM GIPOKSICHESKIKH SRED]**

I. S. Breslav *In its* The Oxygen Regime of the Organism and Its Regulation (Symp.) 1969 p 243-247 (See N69-31401 17-04)

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Human subjects and white mice were studied for their reactions to the inspiration of mixtures with low oxygen content and their preference reactions to various hypoxic environments. Results showed that both humans and animals avoided hypoxic environments and that this negative preference became greater at lower oxygen concentrations. Apparently, the negative preference for hypoxic environments was an integral index, related to increased strain on the control mechanism and caused by oxygen deficiency in inspired air. G.G.

**N69-31439\*#** Israel Program for Scientific Translations, Ltd., Jerusalem.

**OXYGEN SUPPLY IN ANEMIC AND CIRCULATORY HYPOXIA UNDER MOUNTAIN CONDITIONS [KISLORODNOE SNABZHENIE ORGANIZMA PRI ANEMICHESKOI ITSIRKULYATORNOI GIPOKSII V USLOVIYAKH VYSORKOGORYA]**

A. Yu. Tilis *In its* The Oxygen Regime of the Organism and Its Regulation (Symp.) 1969 p 248-252 (See N69-31401 17-04)

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Dogs with vascular lesions and after blood loss, placed under conditions of mountain hypoxia, almost always increased the activity of their circulatory system, maintaining the body's oxygen supply and adapting to the lower partial pressure of oxygen. An animals' stay for one month in the mountains was not sufficient for complete acclimatization to conditions of hypoxia; thus, increased demands on the animal's compensatory mechanism led to heart lesions and blood loss. Complete acclimatization to mountain hypoxia occurred gradually and required prolonged periods. G.G.

**N69-31440\*#** Israel Program for Scientific Translations, Ltd., Jerusalem.

**ADAPTIVE REACTIONS TO BREATHING OXYGEN UNDER PRESSURES OF 1 TO 3 ATMOSPHERES [O PRISPOSOBITEL'NYKH REAKTSIYAKH ORGANIZMA PRI DYKHANII KISLORODOM POD DAVLENIEM OT OДNOI DO TREKH ATMOSFER]**

A. G. Zhironkin et al. *In its* The Oxygen Regime of the Organism and Its Regulation (Symp.) 1969 p 253-257 (See N69-31401 17-04)

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The main physiological reactions to breathing oxygen under high pressure constitute reduced pulmonary ventilatory volume and

arterial oxygenation, vasoconstrictive effects with slowing of blood circulation, and increased oxygen concentration in venous blood. Erythrocytes decreased 7% to 8% and hemoglobin 3% to 6% in human subjects during the first period of oxygen breathing; these changes were transient and pointed to a high oxygen concentration in inspired air. Observed respiration and hemodynamic reactions rapidly disappeared on resuming breathing of ordinary air. G.G.

**N69-31441\*#** Israel Program for Scientific Translations, Ltd., Jerusalem.

**OXYGENATION OF BLOOD AND CEREBRAL TISSUES WHILE BREATHING UNDER EXCESS PRESSURE IN A RAREFIED ATMOSPHERE [OKSIGNATSIYA KROVI I TKANEI MOZGA PRI DYKHANII POD IZBYTOCHNYM DAVLENIEM V RAZREZHENNOI ATMOSFERE]**

I. N. Chernyakov et al. *In its* The Oxygen Regime of the Organism and Its Regulation (Symp.) 1969 p 258-262 (See N69-31401 17-04)

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This paper presents the general results of polarographic investigations of oxygen supply to the body of animals (dogs), while breathing under excess pressure with compensatory mechanisms, at ground level and at altitude. Polarographic determinations were performed of  $pO_2$  in the blood and in the cerebral tissues. Some of the experiments included investigations of  $pCO_2$  dynamics in the blood. The animals' generation condition was monitored by recording the pneumogram, EMG of abdominal muscles, and ECG. The excess pressure in the lungs was generated by a special device which supplied oxygen to an airtight helmet placed on the dog's head. The experiments established the dependence of the oxygen tension in blood and cerebral tissues upon the alveolar  $pO_2$ , excess pressure in the lungs, and efficiency of the compensating system, in experiments carried out at ground level and at altitude. Oxygen breathing under ordinary pressure at ground level caused the  $pO_2$  to increase more than 6 times (up to 670 mm Hg) in the lungs but only 1-1.5 times (up to 155.6%) in the cerebral tissues. Author

**N69-31442\*#** Israel Program for Scientific Translations, Ltd., Jerusalem.

**CHANGE IN RESPIRATION DURING PREGNANCY, AND ITS SIGNIFICANCE IN INTRAUTERINE DEVELOPMENT [IZMENENIE KISLORODNOGO REZHIMA ORGANIZMA PRI BEREMENNOSTI I ZNACHENIE ETOGO IZMENENIYA DLYA VNUTRIUTROBNOGO RAZVITIYA ORGANIZMA]**

M. G. Nemets *In its* The Oxygen Regime of the Organism and Its Regulation (Symp.) 1969 p 263-269 (See N69-31401 17-04)

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The oxygen consumption of pregnant rabbits was studied under conditions of basal metabolism during the last trimester of pregnancy by observing the state of physiological maturity in the newborn animals. It was found that the average oxygen consumption by pregnant rabbits, who subsequently gave birth to physiologically mature young, was 33% higher than the mean oxygen consumption by nonpregnant female rabbits. Injections of estrogen reduced oxygen consumption 15-42% and resulted in either immature young or in intrauterine death through inhibition of the pregnancy center in the CNS. Progesterone injections in nonpregnant female rabbits increased oxygen consumption analogous to same changes in pregnancy. Thus, it was concluded that increased oxygen consumption in pregnancy was maintained by progesterone via the pregnancy center. G.G.

**N69-31443\*** Israel Program for Scientific Translations, Ltd., Jerusalem.

**ACTIVITY OF THIAMINE ENZYMES AT DIFFERENT OXYGEN SUPPLY LEVELS [AKTIVNOST TIAMINOVYKH FERMENTOV V USLOVIYAKA RAZLICHNOI OBESPECHENOSTI ORGANIZMA KISLORODOM]**

Yu. V. Khmelevskii *In its The Oxygen Regime of the Organism and Its Regulation (Symp.)* 1969 p 270-275 (See N69-31401 17-04) Avail: CFSTI CSCL 06P

Observed was the part played by thiamine enzymes in the mechanism of the body's adaptation to variations in oxygen supply. Experimental determination of the pentose phosphate cycle (PPC) in hypoxic dogs and rats showed that the maximum transketolase activity (TA) of cardiac, cerebral, and hepatic tissues was found in newborn animals and decreased with increasing age. Embryonic and undifferentiated tissues showed a high level of glycolysis and of the activities of the enzymes of this cycle, in contrast to variations in the activity of the enzymes of these two systems of carbohydrate oxidation in mature tissues. It was concluded that the animal's maximum resistance to hypoxia coincides with the highest activity of the PPC enzymes. Administration of oxythiamine reduced the activity of thiamine enzymes in the cardiac and hepatic tissues of rats, and also reduced their survival in acute hypoxia. G.G.

**N69-31444\*** Israel Program for Scientific Translations, Ltd., Jerusalem.

**CONTROL OF RESPIRATION IN THE BODY [O REGULIROVANII KISLORODYKH REZHIMOV ORGANIZMA]**  
A. Z. Kolchinskaya et al *In its The Oxygen Regime of the Organism and Its Regulation (Symp.)* 1969 p 276-288 (See N69-31401 17-04)

Copyright. Avail: CFSTI CSCL 06P

Briefly reviewed are the body's control mechanisms for pulmonary ventilation, cardiac output, oxygen transport, oxygen uptake, etc. An attempt is made to apply known principles of automatic control theory to analysis of the respiration control and to develop a structural scheme for this mechanism. General considerations for information transmission channels are outlined for the steady state condition, and the great constancy of partial oxygen pressure is extended to encompass the oxygen requirements in tissues that are under physical loads. G.G.

**N69-31493\*** Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

**EFFECT OF CONFIRMATION PEEKING AND RESPONSE MODE ON PROGRAMMED INSTRUCTION Final Report, Apr. 1965-Jan. 1966**

Horace H. Valverde Dec. 1968 33 p refs  
(AD-686422; AMRL-TR-67-225) Avail: CFSTI CSCL 5/9

An experiment was conducted to determine the effect of peeking on programmed instruction. The study tested the following hypotheses: (1) the requirement for overt responses does not increase learning in programmed instruction, (2) devices or formats to preclude confirmation peeking do not increase the effectiveness of programmed instruction, and (3) time can be saved by eliminating the requirement for overt responses. Two groups of 39 subjects each were used. The subjects were commissioned officer Air Force pilot trainees and Air Force Reserve Officer Training Corps (AFROTC), junior and senior college students matched on the basis of scores obtained on the Officer Quality Composite of the Air Force Officer Qualifying Test (AFUQT). The stimulus material was a radar orientation programmed text. Results of the study were: (1) peeking did not reduce the effectiveness of programmed instruction; (2) students who responded covertly learned as efficiently as students who responded overtly; and (3) covert responding did not save instructional time. Author (TAB)

**N69-31494\*** Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

**DEVELOPMENT OF A COLORIMETRIC PERSONAL DOSIMETER FOR NITROGEN DIOXIDE Final Report, Jul. 1967-May 1968**

Robert F. Rakowski Dec. 1968 22 p refs  
(AD-686423; AMRL-TR-68-104) Avail: CFSTI CSCL 6/20

A personal colorimetric dosimeter for nitrogen dioxide has been developed. Detector strips are prepared by dipping Eastman Chromagram Sheet, Type K301R2, in a solution of diphenylamine and oxalic acid in methanol. When dry, the strips can be used to estimate the concentration-time product to which an individual has been exposed. The strips are sensitive to heat and light. Nitrogen dioxide develops a green color while other oxidizers develop a blue color. The strips are not affected by moisture and should have a shelf life greater than one year. Color standards for concentration-time products of 50, 100, and 300 ppm-minutes and a blue standard to indicate an expired strip are described. A plastic holder for the sensitive detector strips is shown. Author (TAB)

**N69-31517\*** Dartmouth Coll., Hanover, N.H. Dept. of Physiology.  
**METALLIC MICRONUTRIENTS AND INTERMEDIARY METABOLISM Annual Progress Report, Jun. 1968-Apr. 1969**

Henry A. Schroeder Apr. 1969 12 p refs  
(Contract DA-49-193-MD-2595)  
(AD-686297; APR-2) Avail: CFSTI CSCL 6/16

In order to evaluate biological effects of trace elements, mice and rats were exposed for their lifetimes to small doses of each of many essential and abnormal elements in drinking water, in a laboratory and on a regimen designed to avoid environmental contamination. Growth rates, survival and longevity, microscopic pathology of tissues, concentrations of trace elements in tissues, and in rats, blood pressure, serum cholesterol, glucose and uric acid, aortic plaques and lipids and tumor rates were measured or examined. As a result of this work, two prevalent human diseases have been reproduced in rats. (1) A model for human arterial hypertension has been developed in rats fed cadmium. The pathological and physiological criteria are similar: e.g. hypertension, cardiac enlargement and renal arteriolar hypertrophy and early sclerosis. The hypertension can be controlled by removing the renal cadmium by chelation and replacing it with zinc in the chelate. (2) A model for human atherosclerosis has been developed in rats deficient in chromium and fed refined white sugar. The physiological criteria are similar: e.g. relative hypercholesterolemia which increases with age, and mild to moderate hyperglycemia. The pathological manifestations were an increased incidence of aortic plaques, and increased aortic lipids; this aspect is being intensively restudied. These three changes were prevented by the feeding of trivalent chromium. Author (TAB)

**N69-31535\*** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

**CONTRIBUTIONS TO THE DEVELOPMENTAL MECHANICS OF EMBRYOS [BEITRAEGE ZUR EMBRYONALEN ENTWICKELUNGSMECHANIK]**

Wilhelm Roux Washington NASA Jul. 1969 13 p refs Transl. into ENGLISH from Berslauer Aerz. Z., v. 6, 1884 p 57-62  
(Contract NASw-1692)

(NASA-TT-F-12419) Avail: CFSTI CSCL 06C

The development of the frog (*Rana fusca*) eggs is studied in an environment with neutralized directive effect of gravity. It is observed that the fertilized eggs quickly orient themselves to the initial position, when disturbed in water, due to the differences in the specific gravity of the ovum parts. The ova was subjected to continuous revolution to alter the uppermost meridian, and cancel the directional gravity by centrifugal force. It is concluded that the development of the frog eggs occurs normally with no directive and formative action or force from without. F.O.S.



**N69-31619\*#** Pennsylvania State Univ., University Park. Dept. of Biophysics.

**SOLVENT EFFECTS IN THE RADIATION DEGRADATION OF DNA SOLUTIONS**

Carl F. Blackman, Jr. (Ph.D. Thesis) Jun. 1969 86 p refs (Grants NGR-39-009-008; NIH GM-1015) (NASA-CR-103301) Avail: CFSTI CSCL 06A

Calf thymus DNA was prepared in three solvents and irradiated at 77°K for a series of doses and concentrations with cobalt 60 gamma rays. Alkali and neutral band sedimentation was used to obtain initial molecular weight distributions and the molecular weight of both single and double strand samples at each dose. This information was then converted to the number of molecular scissions per molecule by an equation for random scissions. The damage to DNA irradiated at 77°K and warmed to room temperature for analysis was enhanced when phosphate was present; this enhancement was attributed, in part, to indirect radiation action. Differences in the rates of single strand break production were attributed to solvent modifications of radiation action. The double strand break production could be interpreted as resulting from an accumulation of single strand breaks and from directly-produced double strand breaks which occurred when a sensitive core (approximately 3 angstroms in diameter) is hit. Author

**N69-31632\*#** Cornell Univ., Ithaca, N.Y. Dept. of Physiology.

**DIRECTIONAL DOPPLER BLOODFLOW METER Progress Report**

F. D. McLeod May 1969 43 p refs (Grant NGR-33-010-074)

(NASA-CR-103316) Avail: CFSTI CSCL 06P

An ultrasonic blood flowmeter is studied which measures both velocity and flow by utilizing the Doppler effect in the sonic scattering from moving blood cells. A phase detection technique has been adapted for identification and separation of Doppler shifts produced by positive and negative velocity components. Two detectors are utilized, operating in quadrature to identify signal phase change, and thereby the direction of flow. It is concluded that the system is reliable and simple to operate; power requirements are small making it suitable for telemetry application; and reproducibility is better than five percent. F.O.S.

**N69-31647\*#** University of Southern Calif., Los Angeles. Electronic Sciences Lab.

**THE HUMAN OPERATOR IN CONTROL SYSTEMS**

George A. Bekey Mar. 1969 64 p refs (Grant NGR-05-018-022)

(NASA-CR-103307; USCEE-359) Avail: CFSTI CSCL 05E

The material presented first introduces the subject of man-machine systems and indicates some of the input-output characteristics of man. The psychological and engineering approaches to the description of man as a control element are then discussed. Display and control factors are reviewed briefly, with some examples of actual and proposed systems. The engineering approach to control systems is then indicated, and some mathematical models of the human operator's function are presented. Finally, simulation of manned systems is examined briefly, indicating the considerations of stimuli, experimental design, and evaluation criteria. Author

**N69-31676\*#** Baylor Univ., Houston, Tex. Dept. of Psychiatry.  
**PHYSIOLOGICAL CORRELATES OF OPTIMAL PERFORMANCE Semiannual Status Report, 1 Dec. 1968-30 Apr. 1969**

Robert Roessler 30 Apr. 1969 12 p refs (Grant NGR-44-003-031)

(NASA-CR-103302) Avail: CFSTI CSCL 05J

Further work has been accomplished in the following areas: data collection, data analysis, and the preparation and presentation of scientific papers. Author

**N69-31677#** Texas Christian Univ., Fort Worth. Inst. for the Study of Cognitive Systems.

**PARAMETERS OF HUMAN PERCEPTION Semiannual Report, Apr.-Sep. 1968**

Selby H. Evans Sep. 1968 38 p refs

(Contract DAAD05-68-C-0176; Proj. THEMIS)

(AD-685845; SAPR-2) Avail: CFSTI CSCL 5/10

Primary attention was directed to the development of computer systems to produce patterns which simulate aspects of patterns in practical pattern identification tasks, particularly the variability within identification classes. Several pattern simulation systems are described and illustrative output is presented. Other methodological aspects of the research program are described, including investigation of certainty ratings and posterior probabilities as responses in pattern identification. Empirical and theoretical aspects of the research are also discussed; the development and testing of a computer program to simulate human performance in a pattern identification task is noted and further exploration of systems for image enhancement and analysis are described and illustrated. Author (TAB)

**N69-31694\*#** Neurosciences Research Program, Brookline, Mass.  
**BIOLOGY OF DRIVES: A REPORT OF AN NRP WORK SESSION**

Elliot S. Valenstein (Fels Res. Inst.) 1 May 1968 114 p refs *Its Bull.* vol. 6, No. 1

Grants NGR-22-009-018; NIH GM-10211-06; Nonr(6)-00026-67) (NASA-CR-103225) Avail: CFSTI CSCL 05J

In a definitive presentation, the diversity of motivational mechanisms and the nature of drive are discussed. Drive concepts and related behavioral phenomena are considered within the context of ethology, of the physiology, anatomy, and biochemistry of the brain, and of behavioral evolution. The neuroendocrine setting of behavioral propensities and the fractionation and differentiation of arousal processes are discussed on the basis of experimental data. An examination of drive and brain mechanisms deals with motivational and species-typical behavior elicited from the hypothalamus and the preoptic region; the neurophysiological basis of feeding behavior, learning, and reinforcement; and the role of feeding and drinking centers outside of the hypothalamus. The relationships between drive, motivation, reinforcement, and learning are discussed as well as animal tests in reinforcement and motivation. The pharmacological aspects of the adrenergic and cholinergic systems are emphasized in a study of the biological mechanisms of reinforcement. An extensive bibliography on these subjects is included. K.W.

**N69-31695\*#** Neurosciences Research Program, Brookline, Mass.  
**NEUTRAL CODING: A REPORT BASED ON AN NRP WORK SESSION**

20 Dec. 1968 236 p refs *Its Bull.* Vol. 6, No. 3

(Grants NSG-462; NIH GM-10211-07; Nonr(G)-00014-68)

(NASA-CR-103226) Avail: CFSTI CSCL 06P

Candidate codes employing nerve impulses and trains on single channels are initially discussed, followed by a treatment of those codes involving multiple channels of pulse information and representation of information in nonimpulse carriers. The emphasis is on *how* information is represented, while the *meaning* of signals is not examined. Hormones and neurosecretions are considered in their roles as effector-exciters when released by nerve action, or

as sensory stimuli when acting upon neurons. Some attention is given to slow and lasting representation of input and experience, such as various forms of altered excitability, electronic spread, intercellular channels, neuroglial influence, and diffuse as well as field effects. A catalog of candidate neural codes is included which contains brief descriptions of their formal properties and any existing evidence of their functional role in living organisms. K.W.

**N69-31698#** General Foods Corp., White Plains, N.Y.  
**DEVELOPMENT OF MOISTURE BINDING MIMETIC AGENTS** Final Technical Report, Dec. 1966-Dec. 1967  
 Frank Hollis, Jr. Mar. 1969 72 p refs  
 (Contract DAAG17-67-C-0055)  
 (AD-685828; TR-69-50-FL; FL-81) Avail: CFSTI CSCL 6/8

Moisture mimetic agents and panel techniques have been identified and a bench-top procedure applied to dehydrated compressed food bars to eliminate or reduce the sensation of dryness. Preliminary studies have produced chicken stew, chicken, peas and cereal bars which have the prerequisite cube form, nutrition and reduced dryness when consumed. Sensory taste panel data have shown that the classes: polyhydric alcohols, sugars, fruits, fats and oils exhibit beneficial moisture mimetic properties as additives to compressed dehydrated foods. Rehydration, storage and structural stability tests are reported. Author (TAB)

**N69-31750#** National Institutes of Health, Bethesda, Md. Translating Unit.  
**KINETICS OF CELL POPULATIONS**  
 M. Tubiana 25 Apr. 1969 36 p refs Transl. into ENGLISH from Ann. Biol. Clin. (Paris), v. 26, no. 7-9, 1968 p 793-823  
 (Rept-4-35-69) Avail: Issuing Activity

Cell population kinetics is studied by using isotopic labeling, by which the cells are followed through their migrations, or morphological modifications during the process of maturation and differentiation. It is shown that any cell labeling technique must meet the following criteria: binding between label and the cell must be stable; labeling must be specific, i.e. if the cell dies, the label must not be incorporated by another cell; labeling must not modify the behavior of the cell; and must not be toxic. Labeling techniques for different cells are reviewed. Tumor growth, and the kinetics of cell proliferation in tumors are analyzed. Charts summarizing the cell population behavior of various tissues are included. F.O.S.

**N69-31780#** National Institutes of Health, Bethesda, Md. Translating Unit.  
**POSTRADIATION RECOVERY OF YEAST CELLS SIMULTANEOUSLY FROM LETHAL AND SUBLETHAL DAMAGES**  
 V. S. Barsukov, O. V. Malinovskii, and N. M. Mitiushova 27 Jan. 1969 15 p refs Transl. into ENGLISH from the Russian  
 (Rept-1-21-69) Avail: Issuing Activity

The postirradiation recovery of a quiescent culture of the yeast *S. cerevisiae* strain 16 x 32 aa-alpha-alpha, at fractional irradiation with Co<sup>60</sup> gamma rays was examined. Determined was the survival rate dependency on the fractionation interval at the sowing on a nutrient medium immediately after the second fraction of irradiation. Comparison of experimental data with calculated variants showed that the observed increase of survival rate can be explained only by a simultaneous recovery from lethal and sublethal damages. The process of recovery from lethals contained an inhibiting effect on the recovery from sublethals. This phenomenon was explained by the fact that at recovery the lethal damages were liquidated not as a single complete entity but gradually, converting first into sublethals. The difference of the lethals and the sublethals was quantitative prior to the fixation of the lethals. Author

**N69-31782#** National Institutes of Health, Bethesda, Md. Translating Unit.

**DISTRIBUTION OF INTERPULSE INTERVALS IN THE BACKGROUND ACTIVITY OF NEURONS OF THE CAUDATE NUCLEUS, THE RETICULAR FORMATION, AND THE CEREBRAL CORTEX OF THE RAT**

B. F. Tolkunov 27 Feb. 1969 17 p refs Transl. into ENGLISH from Zh. Vyshei Nervnoi Deyatel Nosti (Moscow), v. 18, no. 4, 1968 p 691-700  
 (Rept-2-28-69) Avail: Issuing Activity

Investigated are the characteristics of the distribution of the interpulse intervals in the background activity of the neurons of two large nonspecific formations with reticular structure: the caudate nucleus and the reticular formation of the rat midbrain. The data obtained are compared with results of the investigation of the neurons of the temporal-parietal area of the cerebral cortex. The internal histograms (IH) of the different neurons have varied form; the character of the IH's being, especially in the region of the top of the distribution, not connected with the frequency of the impulse pattern for one and the same neuron during the long period of stimulation. According to the curve of postimpulse probability (PP) all IH's, and consequently the neurons also, may be divided into: (1) neurons, the PP of which increases monotonically and reaches a plateau; and (2) neurons, the PP of which passes through the maximum as a consequence of increased excitability. Neurons of the second type are present in the caudate nucleus in a higher degree than in the reticular formation and the temporal-parietal region of the cerebral cortex. Author

**N69-31788#** School of Aerospace Medicine, Brooks AFB, Tex.  
**THE EFFECTS OF ULTRAVIOLET RADIATION ON THE EYE** Final Report, 1 Sep. 1966-30 Sep. 1968  
 Donald G. Pitts, John E. Prince, Harold W. Casey, Kenneth R. Kay, and Robert W. Bowman Feb. 1969 135 p refs  
 (AD-685724; SAM-TR-69-10) Avail: CFSTI CSCL 6/5

An argon gas forced transpiration arc (FTA) source used to produce a high intensity 180 nm to above 2.5 micron continuous spectrum was described. Calibration technics, monitoring instrumentation and procedures for studying the effects of ultraviolet on the eye were presented. An ultraviolet space energy profile was composed using data from rocket flights. Author (TAB)

**N69-31796#** Naval Submarine Medical Center, Groton, Conn. Submarine Medical Research Lab.  
**LIGHT FLASHES, PUPIL SIZE AND VISUAL PERFORMANCE: AN ANALYSIS OF DISCOMFORT IN THE USE OF ELECTRO-OPTICAL AIDS**

Jo Ann S. Kinney, Leah T. Spitz, and S. M. Luria 22 Jan. 1969 15 p refs  
 (AD-686025; SMRL-558) Avail: CFSTI CSCL 6/16

Two measures of subjects response to brief, bright lights in their field of view have been made: (1) subjective judgements of discomfort and (2) objective measures of the amount of pupil constriction to the lights. These measures were made both before and after a long term visual search task. The results showed that those subjects who performed the search under conditions simulating the use of electro-optical aids did have greater discomfort and pupil constrictions in response to the lights. There was, however, no concomitant decrement in visual performance. Author (TAB)

**N69-31799#** Michigan State Univ., East Lansing. Div. of Engineering Research.  
**CLASSIFICATION OF ELECTRO-ENCEPHALOGRAMS WITH PATTERN RECOGNITION ALGORITHMS** Interim Scientific Report

Richard C. Dubes, Albert Hung, and W. R. McCrum Mar. 1969 39 p refs  
(Grant AF-AFOSR-1023-67)  
(AD-685734; AFOSR-69-0964TR; ISR-4) Avail: CFSTI CSCL 6/3

The report proposes a mathematical model for making decisions about the condition of a subject from EEG data and algorithms for implementing the model. Pattern recognition methods are combined with the experience of a practicing electroencephalographer to balance the availability of mathematical models, computational feasibility, and experience. The aim of the model building is to produce a computationally feasible algorithm for a digital computer that generates a chart showing the condition of the subject as a function of time. The report gives preliminary results on feature extraction. In its present version, the pattern recognizer treats feature extraction and pattern classification distinctly and limits learning to transition probabilities of the Markov chain. The decision procedure that is outlined is applicable to any model that defines discrete states and permits Markovian movement between states.

Author (TAB)

**N69-31806#** Medical Coll. of Virginia, Richmond. Health Sciences Div.

**BIOLOGICAL APPLICATIONS AND EFFECTS OF OPTICAL MASERS**

William T. Ham, Jr., Alexander M. Clarke, Stephen F. Cleary, Harold A. Mueller, and Walter J. Geeraets Apr. 1969 24 p refs  
(Contract DA-49-193-MD-2241)

(AD-685872; USAMRDC-1968-6) Avail: CFSTI CSCL 6/16

The biological effects of Q-switched, gated and normal pulse train mode Nd and ruby lasers, and CW argon and He-Ne lasers are discussed, together with the equipment used to produce these effects. Induced sonic transient phenomena, retinal thermal damage threshold values, and visual decrement as a result of optical irradiation are shown. A bibliography of recent publications in related areas is included.

Author (TAB)

**N69-31807#** Stanford Research Inst., Menlo Park, Calif.

**MONOMAN CALORIMETER PROJECT Final Report**

Richard K. Pefley, Edward T. Cull, Jr., and Michael K. Sekins Jan. 1969 69 p refs Prepared in cooperation with Santa Clara Univ.  
(Contract DAHC20-67-C-0136)

(AD-685878; ME-69-1) Avail: CFSTI CSCL 6/19

Sedentary metabolic values of men, women, and children are determined from data taken in a direct calorimetry system. This data is for very low air flow rates and high temperatures and humidities. The metabolism is divided into sensible and latent components and is pictorialized as a non-isostate process on the psychrometric chart. Heat and mass transfer coefficients are determined and used to predict the upper limit of hot environment that is possible without thermal strain. Occupant subjective reactions to the environment are also considered.

Author (TAB)

**N69-31813#** Michigan State Univ., East Lansing. Div. of Engineering Research.

**BAYESIAN LEARNING IN MARKOV CHAINS WITH OBSERVABLE STATES Interim Scientific Report**

Richard C. Dubes and Patrick J. Donoghue Mar. 1969 34 p refs  
(Grant AF-AFOSR-1023-67)

(AD-685735; AFOSR-69-0963TR; ISR-5) Avail: CFSTI CSCL 9/4

Two practical and related problems concerning decision-making with observations from Markov chains are considered in this report. First, Bayesian learning theory is used to develop recursive relations for the densities of the unknown parameters in a

Markov chain, based on classified observations of the chains states. Computationally simple results are obtained using a matrix-beta distribution for the chains parameters. In the case of unsupervised observations, the basic relations for learning are derived and methods for their implementation are discussed. Second, the related problem of deciding which of a set of chains is active, based on state observations, is considered. Two data-generating models are proposed and decision rules are derived. A particularly useful result is derived for one model using the matrix-beta distribution for the unknown parameters. The decision rule for the more difficult model is then derived and its implications discussed. Simulation results for a specific example show the probability of error for different amounts of training data and demonstrate the inherent practicality of the results.

Author (TAB)

**N69-31820#** Bunker-Ramo Corp., Canoga Park, Calif.

**OPERATIONAL TASKS ORIENTED FLYING TRAINING PROGRAM FOR PILOT TRAINING: THE SYSTEMS APPROACH**

Clarence A. Sample and Melvin S. Majesty Wright-Patterson AFB, Ohio AF Human Resources Lab. Jan. 1969 52 p refs  
(Contract F33615-68-C-1533)

(AD-685776; AFHRL-TR-68-4) Avail: CFSTI CSCL 5/9

The purpose of the study was to take a fresh and independent look at flying training requirements unhampered by the current training program and the traditional approach. The report presents a systems methodology for determining knowledges and skills common to piloting tasks required by differing aircraft-missions for the purpose of structuring a data base from which an operational tasks oriented flying training program could be developed. The general approach was to identify and classify the specific tasks performed by USAF pilots and the level of proficiency required on each task for successful performance in current and projected assignments in operational units using present and projected aircraft. The study was planned to encompass cross-system analysis and the integration of pilot tasks data into the Air Force Human Resources Laboratory's computer based data bank. Therefore, inquiries across and within aircraft systems pertaining to piloting tasks, training requirements, and performance standards would be possible. Criteria for establishing common mission segments, tasks and cockpit subsystem hardware are presented. The technique for analyzing common tasks is presented in relation to assumptions regarding the type of training programs to which the data could apply. Rules for describing task activities and preparing the data for insertion into the computer based data bank are given.

Author (TAB)

**N69-31876\*#** Neurosciences Research Program, Brookline, Mass.  
**SYMPOSIUM ON FRONTIERS OF MOLECULAR NEUROBIOLOGY**

30 Oct. 1968 Repr. from Proc. of the Natl. Acad. of Sci., v. 60, no. 4, Aug. 1968 p 1055-1101 refs Meeting held at Washington, 22 Apr. 1968 /ts Bull. Vol. 6, Supplement  
(Grants Nsg-462; NIH-GM10211-07; Nonr(G)-00014-68)  
(NASA-CR-103381) Avail: CFSTI CSCL 06P

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**N69-31877\*#** California Univ., San Diego. School of Medicine.  
**REPRESENTATION OF INFORMATION IN NEURONS AND SITES FOR MOLECULAR PARTICIPATION**

Theodore H. Bullock *In* Neurosci. Res. Program Symp. on Frontiers of Mol. Neurobiol. 30 Oct. 1968 p 4-14 (See N69-31876 18-04)

Avail: CFSTI CSCL 06P

The theory that there is not one code of nerve impulses, but several, and that for each cell there is not one strategic site, but several is proposed. Heretofore, frequency was the only code employed, but five other properties of impulses in single axons are presented as candidates for codes. These impulse properties are number, latency, variation, micropattern, and sputtering. More than one site of lability, the synapse, is introduced. Four general aspects of molecular participation are given: many loci, the equivalence of many changes, the stability of many excitabilities, and the need for explicitly stated roles for specificity. J.A.M.

**N69-31878\*#** Johns Hopkins Univ., Baltimore, Md. Dept. of Physiological Chemistry.

**THE NEURONAL MEMBRANE**

Albert L. Lehninger *In* Neurosci. Res. Program Symp. on Frontiers of Mol. Neurobiol. 30 Oct. 1968 p 15-26 refs (See N69-31876 18-04)

Avail: CFSTI CSCL 06P

Structural organization of the neuronal membrane in relation to one of its most characteristic and specific functions, the propagation of the nerve impulse along the axon, is given. Glial cells near or surrounding the axon, the structure and purpose of the plasma membrane, structural protein of the membrane, the outer coat of the neuronal membrane composed of glycolipids and glycoproteins, adjacent intercellular space containing hyaluronic acid, divalent cations, action potential, and cooperative interactions in membrane functions are discussed. Models of membrane structure are presented. J.A.M.

**N69-31879\*#** Cambridge Univ. (England). Dept. of Biochemistry.  
**SYNAPTIC TRANSMISSION**

Victor P. Whittaker *In* Neurosci. Res. Program Symp. on Frontiers of Mol. Neurobiol. 30 Oct. 1968 p 27-37 refs (See N69-31876 18-04)

Avail: CFSTI CSCL 16A

Electron microscopic, histochemical, and iontophoretic techniques support the concept that transmission at most synapses is brought about by the release of small amounts of chemical transmitter substances. Acetylcholine and the monoamines (noradrenaline, dopamine, and 5-hydroxytryptamine) are discussed as being central transmitters as well as the amino acids, glutamate, glycine, and  $\gamma$ -aminobutyrate. Drugs are examined that act on the central nervous system as analogs of chemical transmitters. Isolation of presynaptic nerve terminals and their component organelles, synaptosomes, are presented as well as synaptic vesicles, external synaptosome membranes, and postsynaptic membranes. J.A.M.

**N69-31880\*#** Massachusetts Inst. of Tech., Cambridge. Dept. of Biology.

**FIBROUS PROTEINS-NEURONAL ORGANELLES**

Francis O. Schmitt *In* Neurosci. Res. Program Symp. on Frontiers of Mol. Neurobiol. 30 Oct. 1968 p 38-47 refs (See N69-31876 18-04)

Avail: CFSTI CSCL 06P

Neurofilaments and microtubules, the basis of fibrous structure in neurons, are described. Their biochemical and biophysical characteristics are supported by electron microscopy. Neuronal microtubules concerned with neuroplasmic transport down the axon

and possibly within cell body and dendrites are discussed. Mechanochemical coupling in transport and the role of fibrous protein in molecular neurobiology are also presented. J.A.M.

**N69-31922\*#** Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.  
**BIOENGINEERING IN SPACE: THE BIOSATELLITE URINALYSIS INSTRUMENT**

J. L. Stuart 1 Jul. 1969 82 p

(Contract NAS7-100)

(NASA-CR-103420; JPL-TR-32-1400) Avail: CFSTI CSCL 06S

A urinalysis for calcium, creatinine, and creatine is performed four times daily in a 15-lb automated chemical laboratory. This analysis is performed once daily on standard solutions. The instrument contains a fluorometer for the calcium analyzer, and a nephelometer for the creatine and creatinine analyzer. The instrument also contains the electronics to perform logic sequencing, data acquisition, data storage, the power supplies, and the analyzer amplifiers. All the chemicals required for 150 analyses of each constituent (a total of 450 analyses) are stored within the instrument, which is designed for a 30-day orbital spacecraft mission. The instrument system and the various subsystems' design configuration needed to meet the scientific experiment and flight-program constraints are discussed in this report. Author

**N69-31923\*#** National Aeronautics and Space Administration, Washington, D.C.

**AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES**

Jul. 1969 154 p

(NASA-SP-7011(65)) Avail: CFSTI CSCL 06S

Subject coverage concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. Each entry consists of a standard citation accompanied by its abstract. Author

**N69-31943\*#** California Univ., Berkeley.  
**PERIPHERAL VOLUME MEASUREMENTS AS INDICES OF PERIPHERAL CIRCULATORY FACTORS IN THE CARDIOVASCULAR ORTHOSTATIC RESPONSE**

Loren D. Carlson, Richard F. Walters, Stephen J. Bartok, Steven H. Weinberg, Dennis C. Lindberg et al [1968] 192 p refs

(Grant NGR-05-004-026)

(NASA-CR-101812) Avail: CFSTI CSCL 06P

Non-invasive techniques for measuring changes in limb volume and the application of these techniques in assessing the deconditioning caused by bedrest were evaluated. This involved blood flow measurements by venous occlusion plethysmography and the following three techniques: (1) limb circumference changes measured by a resistance transducer; (2) limb volume changes by capacitance measurements; and (3) limb volume changes by impedance measurement. The bedrest study was conducted with ten subjects in conjunction with a medical examination which covered metabolic balance, basal metabolism, work metabolism, fluid spaces, body composition, strength tests, renal function, and composition of blood and urine. Results in the present study reflect the cardiovascular function of the subjects following bedrest. Heart rate and blood pressure served as a reference and comparative values

for other tests. The tests involved various cycles of bedrest, activities, negative pressure runs, and periods of rest on tilt tables.  
K.W.

**N69-31945\*#** General Electric Co., Philadelphia, Pa. Re-Entry Systems.

**THE BIOSATELLITE PROGRAM**

Mark Morton 16 Aug. 1969 48 p

(Contracts NAS2-1900; NAS2-2190)

(NASA-CR-73347) Avail: CFSTI CSCL 06S

A pictorial review is presented of the Biosatellite orbital spacecraft and reentry system. Biosatellite experiments are aimed at studying the effects of long-term weightlessness, weightlessness combined with radiation, as well as the removal of biological specimens from the direct influence of earth's periodicity. The Biosatellite is a fully automated system, featuring provisions for continuous telemetry and recording. Recovery from orbital flight of all experiments will allow post-flight analyses and evaluation by the Bio-sciences community. Biosatellite missions are categorized by their nominal time in orbit, and the objectives of the experiments as follows: The purpose of the three-day experiments is to determine effects of weightlessness and possible interaction between weightlessness and ionizing radiation; thirty-day flight for study of neurophysiological, cardiovascular, and metabolic functions in a high order primate. Author

**N69-31967#** Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

**PRINCIPLES OF THE BOYLE'S LAW EMERGENCY PRESSURE SUIT AND THEIR APPLICATION Final Report**

Otto Schueller Dec. 1968 31 p refs

(AD-685720; AMRL-TR-67-234) Avail: CFSTI CSCL 6/17

An urgent requirement exists for a simple, reliable emergency pressure suit, permeable to air and comfortable while unpressurized, the condition in which the pressure suit is worn most of the time. The Boyles Law Suit meets these essential requirements. It uses the expansion of gas sealed in multiple tubes for producing mechanical counterpressure on the skin. Oxygen is used in the mask or helmet only for breathing, thus reducing vulnerability and fire hazard to a minimum. This report analyzes the physical and technical principles of the Boyles Law Suit and their practical application toward improving design of the tube system, minimizing bulk, tube charging procedures, and sizing and adjustment possibilities. Finally, recommendations for redesigning the oxygen regulator to minimize breathing effort are given. Author (TAB)

**N69-32040** Minnesota Univ., Minneapolis.

**AUGMENTED DIFFUSION OF OXYGEN**

Thomas Robert Stein (Ph.D. Thesis) 1968 129 p

Avail: Univ. Microfilms: HC \$6.20/Microfilm \$3.00 Order No. 69-1536

Experimental apparatus was designed to measure the one

dimensional flux of oxygen through a stagnant layer. An integral part of this apparatus was a planar, disk-type oxygen electrode which measures the total flux of oxygen. Diffusivity coefficients were measured in a cobalt-histidine complex which reacts reversibly with oxygen. Both the concentration of the complex and oxygen partial pressure were varied over a wide range of values. Increases in the effective diffusivity of oxygen as great as 400% were observed. The diffusivity of oxygen through several red blood cell-Agar suspensions was measured. It was found that hemoglobin immobilized in this way does not augment the flux of oxygen as free hemoglobin does. The diffusivity of oxygen in whole blood is estimated to be  $1.0 (\pm 0.06) \times 10^{-5} \text{ cm}^2/\text{sec}$  at  $25^\circ\text{C}$   
Dissert. Abstr.

**N69-32044\*#** Scripta Technica, Inc., Washington, D.C.

**PROBLEMS OF SPACE BIOLOGY. VOLUME 7: OPERATIONAL ACTIVITY, PROBLEMS OF HABITABILITY AND BIOTECHNOLOGY**

V. N. Chernigovskiy, ed. NASA May 1969 527 p refs Transl. into ENGLISH of the book "Problemy Kosmicheskoy Biologii. Vol. 7: Rabochaya Deyatel'nost, Voprosy Obitayemosti i Biotekhnologiya" Moscow, Nauk, 1967

(Contract NASw-1694)

(NASA-TT-F-529) Avail: CFSTI CSCL 06S

In the papers presented, three problems are examined: psychophysiological aspects of operational activity, questions relating to the habitability and hygiene of spacecraft cabins, and the problem of biotechnology. For individual titles, see N69-32045 through N69-32106.

**N69-32045\*#** Scripta Technica, Inc., Washington, D.C.

**PROBLEMS OF RELIABILITY OF MAN IN SPACECRAFT CONTROL SYSTEMS**

P. K. Isakov et al. In its Probl. of Space Biol., Vol. 7 May 1969 p 3-7 refs Presented at the 2d Intern. Symp. on Basic Environmental Probl. of Man in Space, Paris, 14-18 Jun. 1965 (See N69-32044 18-05)

Avail: CFSTI CSCL 05H

The operator-spacecraft system, a closed multicircuit system, is discussed. The need for a wide use of terrestrial laboratories for the investigation of the reliability and efficiency characteristics of the operator is stressed. The basic problems for solution by means of models of the man-machine system, simulating not only the control process but also conditions creating the particular state of the man-operator, are noted. Author

**N69-32046\*#** Scripta Technica, Inc., Washington, D.C.

**SOME ASPECTS OF THE ACTIVITY OF SENSORY SYSTEMS AS APPLIED TO PROBLEMS OF SPACE PHYSIOLOGY**

V. D. Glezer et al. In its Probl. of Space Biol., Vol. 7 May 1969 p 8-21 Presented at the 2d Intern. Symp. on Basic Environmental Probl. of Man in Space, Paris, 14-18 Jun. 1965 (See N69-32044 18-05)

Avail: CFSTI CSCL 06S

Problems connected with obtaining and processing of information and the diagnosis of sensory forms are discussed. Experimental data are presented on orientation in space, diagnosis of visual forms and of the sounds of speech. These problems are analyzed as they apply to spacecraft control. Author

N69-32047\*# Scripta Technica, Inc., Washington, D.C.

**PSYCHOPHYSIOLOGICAL CHARACTERISTICS OF THE SOLUTION OF MOTOR PROBLEMS BY MAN**N. A. Rokotova *In its Probl. of Space Biol.*, Vol. 7 May 1969 p 22-50 refs (See N69-32044 18-05)

Avail: CFSTI CSCL05H

Grouping of motor acts during learning and performance of assigned sequences was studied. Grouping is the central mechanism of operational programs, and the group of actions is an element of the operational program. The temporal organization of a sequence of human actions is examined. During frequent repetition of a series of learned movements the performance time, both of the whole series and of its component groups of movements and separate motor acts, varies within small limits. The argument is put forward that the temporal organization of human actions is connected with the presence of an internal rhythmic process assigning the regular rhythm of work.

Author

N69-32048\*# Scripta Technica, Inc., Washington, D.C.

**ON CERTAIN FEATURES OF PROGRAMMING A SEQUENCE OF HUMAN ACTIONS**N. A. Rokotova et al *In its Probl. of Space Biol.*, Vol. 7 May 1969 p 51-63 refs (See N69-32044 18-05)

Avail: CFSTI CSCL05H

The role of grouping in learning and performance of an ordered sequence of human actions was studied. Grouping determines both the course of learning and the character of performance of the sequence of actions. It is postulated that a group of actions describable by a common characteristic is an element of the operational program.

Author

N69-32049\*# Scripta Technica, Inc., Washington, D.C.

**NERVE CONTROL OF THE TEMPO OF MOTION IN MAN AND POSSIBLE METHODS OF REPRESENTING TIME IN THE NERVOUS SYSTEM**N. A. Rokotova *In its Probl. of Space Biol.*, Vol. 7 May 1969 p 64-74 refs (See N69-32044 18-05)

Avail: CFSTI CSCL05H

Control of the tempo of movements by the human nervous system is examined as a control over two functions. The first of these describes the level of maintenance of the tempo. The second function alters the tempo. The normal human adult can maintain any performance tempo of his own choice with great precision. A change in tempo by a certain amount and maintenance of the new tempo are possible. The accuracy of performance, describable as  $\delta t/t = \text{const.}$ , while a change in tempo by a minimal amount, describable as  $\Delta t$ , is controlled by a function bearing a logarithmic relationship to the original tempo.

Author

N69-32050\*# Scripta Technica, Inc., Washington, D.C.

**ORGANIZATION OF A SYSTEM OF ACTIONS IN THE CASE OF RANDOM ALTERNATION OF SIGNALS**Ye. S. Rogovenko *In its Probl. of Space Biol.*, Vol. 7 May 1969 p 75-83 refs (See N69-32044 18-05)

Avail: CFSTI CSCL05H

The object of this investigation was to study how man organizes a system of four actions (pressing on keys arranged in a row) under the conditions of a random order of two equally probable signals, when two actions were connected with each signal. To organize their system of actions all the subjects used the method of seeking rules for their choice of decisions. At first they

divided all the actions into two groups connected with each signal, then established rules for changes between actions within the limits of the group on repetition of the signals, while at the end of learning rules were formed for changes between actions belonging to different groups with a change in the signal. When establishing connections between actions the subjects combined changes performed with the same order of the signals into a rule for working with this order. The phenomenon of transfer of the rule of working established for repetition of one signal to the case of repetition of the other signal was observed in most subjects.

Author

N69-32051\*# Scripta Technica, Inc., Washington, D.C.

**ORGANIZING A SYSTEM OF ACTIONS WITH RANDOM ALTERNATION OF SIGNALS, SEARCH AND CHOICE OF ACTIONS**Ye. S. Rogovenko *In its Probl. of Space Biol.*, Vol. 7 May 1969 p 84-93 refs (See N69-32044 18-05)

Avail: CFSTI CSCL05H

The object was to examine how man forms a system of actions under the conditions of a random order of two equally probable signals if allowed to choose his own concrete actions and switch from one to another. Subjects were instructed to work at a problem on a switchboard with 12 keys arranged 4 in a row. During training most subjects reduced the number of their actions to 4. The design of the switchboard enabled the subjects to organize a system of actions in a two-dimensional space. During formation of a system of actions under these conditions the subjects used the method of seeking reference points and switching between them so as to compose a complete symmetrical figure on the surface of the switchboard.

Author

N69-32052\*# Scripta Technica, Inc., Washington, D.C.

**COMPARATIVE SPEEDS AND VARIABILITY OF MOTION OF THE FINGERS OF MAN**I. D. Bogina *In its Probl. of Space Biol.*, Vol. 7 May 1969 p 94-108 refs (See N69-32044 18-05)

Avail: CFSTI CSCL05H

Movements of each finger (tapping on a teletype switchboard) of both hands by 3 subjects at three speeds chosen by the subjects were studied: fast, optimal, slow. Essential differences were found between the intervals of the mean duration of the movements at different speeds. High correlation exists between the various fingers of the subject's two hands at a given speed. Great similarity also is found between mean values of duration of movements by different subjects at a given speed. There are grounds for supposing that the movement cycle is a more highly organized interval than its component elements, and that for rapid and optimal imprinting the interval of the movement cycle is evidently assigned.

Author

N69-32053\*# Scripta Technica, Inc., Washington, D.C.

**EFFECTOR ACTIVITY OF A HUMAN BEING IN FIXING PERFORMANCE TIME**I. M. Gorbunova et al *In its Probl. of Space Biol.*, Vol. 7 May 1969 p 109-128 refs (See N69-32044 18-05)

Avail: CFSTI CSCL05H

In investigations on human subjects performing a sequence of actions in a set time interval high accuracy of work was found. The error of performance did not exceed 5% of this interval. The error committed during performance of the sequence could be compensated in the next operation. The presence of compensation

depends on the magnitude of the error but not on its sign. Compensation of error took place by a change in work tempo, i.e., by a change of a definite amount in the movement cycle either throughout the sequence or in its first and second halves. It is postulated that the mechanism of compensation of errors is associated with two-dimensional tracking of signals conveying information about time—an external signal and the frequency of the subject's own movements.

Author

**N69-32054\*# Scripta Technica, Inc., Washington, D.C.**  
**CHARACTERISTICS OF THE BIOMECHANICS OF**  
**ELEMENTARY HUMAN MOTION UNDER THE CONDITIONS**  
**OF WEIGHTLESSNESS AND G-LOADING**

L. V. Chkhaidze et al *In its Probl. of Space Biol.*, vol. 7 May 1969 p 129-140 refs (See N69-32044 18-05)

Avail: CFSTI CSCL 06S

Under conditions of brief (not more than 30 sec) weightlessness and during overloads (not exceeding 2 units, duration 15-18 sec), the biomechanics of human movements (slow flexion and extension of the elbow and of the laden and unladen hand, slow flexion and aimed extension of the same joint and rapid flexion and sudden unaimed extension of the same joint) was studied cyclogrammetrically. In weightlessness the actual muscular effort needed to perform the corresponding elements of the coordinated structure of the studied movements falls to 50%, and in overloads of up to 2 units it rises. Increased activity of the nervous centers correcting performance of skilled movements is observed.

Author

**N69-32055\*# Scripta Technica, Inc., Washington, D.C.**  
**THE STATE AND EFFICIENCY OF A HUMAN BEING**  
**DURING PROLONGED CONFINEMENT IN A SPACECRAFT**  
**SIMULATOR**

S. G. Zharov et al *In its Probl. of Space Biol.*, Vol. 7 May 1969 p 141-150 refs (See N69-32044 18-05)

Avail: CFSTI CSCL 06S

Data for the general state and working ability of man during a 12-day stay in a simulated spacecraft are described. Reliability of the work of man as an operator falls under these conditions. Changes are observed also in his general state (stagnant exaltation of the  $\alpha$ -rhythm, decrease in amplitude of ECG waves, slowing of atrioventricular conduction, diminution of bioelectrical activity of muscles, weakening of the orienting reflex, and so on). Changes are particularly marked if the subjects, after the experiment, were exposed to overloads on a centrifuge or did physical exercises by running on a moving tract.

Author

**N69-32056\*# Scripta Technica, Inc., Washington, D.C.**  
**MAINTENANCE OF A GIVEN STATIC FORCE WHILE THE**  
**FORCE OF GRAVITY IS TRANSFORMED**

M. A. Cherepakhin *In its Probl. of Space Biol.*, Vol. 7 May 1969 p 151-156 refs (See N69-32044 18-05)

Avail: CFSTI CSCL 06S

A human skilled movement was studied experimentally during flights by a jet aircraft along a parabola of weightlessness. Maintenance of a static effort during periodic transformation of gravitational force in the presence of visual control took place accurately, but in the absence of such control accuracy of maintenance of the assigned effort depended on the subjects' body weight. During exposure to overloads a tendency was observed for the effort to increase if the overload vector coincided with the direction of effort, but in weightlessness the effort was reduced. The bioelectrical activity of the investigated muscles increased slightly

during overloads of under 1.5-2 units and during performance under visual control, but rose sharply in weightlessness. Biopotentials of the postural muscles decreased sharply in weightlessness but rose slightly during overloads.

Author

**N69-32057\*# Scripta Technica, Inc., Washington, D.C.**  
**CONTRIBUTION TO THE PROBLEM OF OCULOGRAVIC**  
**ILLUSION**

L. A. Kitayev-Smyk *In its Probl. of Space Biol.*, Vol. 7 May 1969 p 157-161 refs (See N69-32044 18-05)

Avail: CFSTI CSCL 06S

Oculogravic illusions arising as a result of afferent impulses denoting changes in the oculomotor apparatus compensating tonic influences of gravity receptors on it are studied. The oculogravic illusion is regarded as part of an illusory distortion of visually perceived space arising under the influence of gravitation.

Author

**N69-32058\*# Scripta Technica, Inc., Washington, D.C.**  
**OPTICAL ILLUSIONS IN MAN IN THE CASE OF**  
**WEIGHTLESSNESS AND OF THE COMBINED EFFECTS OF**  
**WEIGHTLESSNESS, ANGULAR AND CORIOLIS**  
**ACCELERATION**

L. A. Kitayev-Smyk *In its Probl. of Space Biol.*, Vol. 7 May 1969 p 162-169 (See N69-32044 18-05)

Avail: CFSTI CSCL 06S

The onset of illusory changes in the form of visual objects in a number of subjects is described during weightlessness created in an aircraft during flights along a parabolic trajectory. With the onset of partial weightlessness immediately after absence of gravitational force, these illusions disappeared. During the combined action of weightlessness and radial or Coriolis acceleration the visual illusions in some subjects were of a special character. On the basis of comparison of illusions described in this work with known clinical and experimental data a possible mechanism is suggested for the visual disturbances arising in weightlessness.

Author

**N69-32059\*# Scripta Technica, Inc., Washington, D.C.**  
**PHYSIOLOGICAL HYGIENIC EVALUATION OF THE**  
**LIFE-SUPPORT SYSTEMS OF VOSTOK AND VOSKHOD**  
**SPACECRAFT**

G. I. Voronin et al *In its Probl. of Space Biol.*, Vol. 7 May 1969 p 170-180 Presented at the 2d Intern. Symp. on Basic Environmental Probl. of Man in Space, Paris, 14-18 Jun. 1965 (See N69-32044 18-05)

Avail: CFSTI CSCL 06K

Hygienic and technical problems of life support in spacecraft are analyzed. The life-support system described maintained the parameters of the gaseous medium within limits of: pressure from 750 to 755 mm Hg, temperature from +19 to +20°, humidity from 62% to 69%, oxygen concentration from 21% to 22%, carbon dioxide from 0.4% to 0.6%.

Author

**N69-32060\*# Scripta Technica, Inc., Washington, D.C.**  
**EFFECT ON THE ORGANISM OF PROLONGED**  
**CONFINEMENT (100 DAYS) IN A PURE OXYGEN**  
**ATMOSPHERE AT OVERALL PRESSURE OF 198 mm Hg**

N. A. Agadzhanian et al *In its* Probl. of Space Biol., Vol. 7 May 1969 p 181-188 refs Presented at the 2d Intern. Symp. on Basic Environmental Probl. of Man in Space, Paris, 14-18 Jun. 1965 (See N69-32044 18-05)  
 Avail: CFSTI CSCL 06S

Hygienic and physiological aspects of a long stay in an atmosphere of pure oxygen are discussed. Actual experimental data relating to a stay of 100 days in an atmosphere of pure oxygen with a total pressure of 198 mm Hg are given. Author

**N69-32061\*#** Scripta Technica, Inc., Washington, D.C.  
**CERTAIN FUNCTIONS OF THE CENTRAL NERVOUS SYSTEM AND GAS EXCHANGE DURING PROLONGED CONFINEMENT OF ANIMALS IN A HYPEROXIC HELIUM ENVIRONMENT**

A. G. Gironkin et al *In its* Probl. of Space Biol., Vol. 7 May 1969 p 189-192 refs (See N69-32044 18-05)  
 Avail: CFSTI CSCL 06S

Defensive conditioned reflexes were studied in mice during a stay of 20 days in an atmosphere rich in oxygen (60%). Considerable delay in conditioned reflex formation was found in animals kept in a helium-oxygen medium. Author

**N69-32062\*#** Scripta Technica, Inc., Washington, D.C.  
**HUMAN REACTIONS TO HYPOXIA AND HYPERCAPNIA WHEN BREATHING NITROGEN AND HELIUM OXYGEN MIXTURES**

I. S. Breslav et al *In its* Probl. of Space Biol., Vol. 7 May 1969 p 193-199 refs (See N69-32044 18-05)  
 Avail: CFSTI CSCL 06S

The investigation was carried out on men and women aged 18-25 years, using the gas-preferendum method. Under normal and hypoxic conditions the subjects preferred helium mixtures. They reacted negatively to a mixture with 2.5-6% CO<sub>2</sub> in an atmosphere of helium, but not to it in an atmosphere of nitrogen. Author

**N69-32063\*#** Scripta Technica, Inc., Washington, D.C.  
**PHYSIOLOGICAL EFFECT OF THE REPLACEMENT OF NITROGEN IN THE AIR BY HELIUM IN THE CASE OF OXYGEN DEFICIENCY AND HIGH CO SUB 2 CONCENTRATIONS**

A. G. Dianov *In its* Probl. of Space Biol., Vol. 7 May 1969 p 200-210 refs (See N69-32044 18-05)  
 Avail: CFSTI CSCL 06S

During the experiment the body temperature, respiration rate and pulse rate were measured. Replacement of the nitrogen of the air by helium had a beneficial effect on the responses of the animals under conditions of hypoxia and hypercapnia. Author

**N69-32064\*#** Scripta Technica, Inc., Washington, D.C.  
**SOME PECULIARITIES OF THE SPEECH FUNCTION IN A CHANGED GAS MEDIUM**

V. S. Kuznetsov *In its* Probl. of Space Biol., Vol. 7 May 1969 p 211-216 refs (See N69-32044 18-05)  
 Avail: CFSTI CSCL 06S

The characteristics of speech formation were investigated in subjects staying for 10-22 days in a helium-oxygen atmosphere. In a medium containing 21% oxygen, 2-4% nitrogen and up to

75% helium, speech showed an increase on the average of 0.7 octave in the pitch of 'formants and a fairly high degree of punctiliousness, which is attributed to the richness of the Russian language, and it is maintained by the high intensity of acoustic and vocal compensatory mechanisms. Author

**N69-32065\*#** Scripta Technica, Inc., Washington, D.C.  
**RESPIRATION OF OXYGEN AT HIGH PRESSURE, FEATURES OF AND TRAINING FOR SUCH RESPIRATION AND THE PHYSIOLOGICAL BASIS**

V. A. Skrypin *In its* Probl. of Space Biol., Vol. 7 May 1969 p 217-225 refs (See N69-32044 18-05)  
 Avail: CFSTI CSCL 06S

A critical analysis of the problem of oxygen breathing under increased pressure is given. The physiological basis of the training program is discussed. Author

**N69-32066\*#** Scripta Technica, Inc., Washington, D.C.  
**THE EFFECT OF PHYSICAL TRAINING UNDER NORMAL AND INCREASED PARTIAL OXYGEN PRESSURE ON THE STABILITY OF WHITE MICE TO TRANSVERSE GRAVITATIONAL ACCELERATION AND HYPOXIA**

P. V. Vasilyev et al *In its* Probl. of Space Biol., Vol. 7 May 1969 p 226-233 refs (See N69-32044 18-05)  
 Avail: CFSTI CSCL 06S

Static or dynamic physical training is an effective method of increasing resistance of the body to the action of radial accelerations and to a lowered partial pressure of oxygen. Particularly high survival rates were obtained when physical training was combined with exposure to hypoxia. Author

**N69-32067\*#** Scripta Technica, Inc., Washington, D.C.  
**EFFECT OF A DIFFERENTIAL RATE OF GROWTH OF ANOXIA ON THE VEGETATIVE FUNCTIONS AND BIOELECTRIC ACTIVITY OF THE BRAIN OF A DEVELOPING ORGANISM**

I. G. Dallakyan et al *In its* Probl. of Space Biol., Vol. 7 May 1969 p 234-245 refs (See N69-32044 18-05)  
 Avail: CFSTI CSCL 06S

Dynamics of EEG changes was studied in rabbits in relation to changes in autonomic functions (respiration and cardiac activity) during development of hypoxia at two rates (1 and 15 m/sec) in animals of different ages. In young rabbits (not more than 20 days old) at the rate of 2 m/sec the altitude ceiling is 13,000 m, and at 15 m/sec 11,000 m. This difference disappears with age. At the rate of 2 m/sec respiration is affected first, then bioelectrical activity of the brain, followed by cardiac activity. At 15 m/sec this order was found only in older animals. In the early stage of ontogenesis autonomic changes arise simultaneously. In older rabbits at the rate of 15 m/sec, profound qualitative changes were found in the ECG. Author

**N69-32068\*#** Scripta Technica, Inc., Washington, D.C.  
**THE INFLUENCE ON MAN OF A LONG STAY UNDER CONDITIONS OF REDUCED BAROMETRIC PRESSURE AND RELATIVE ISOLATION**



D. I. Ivanov et al *In its Probl. of Space Biol.*, Vol. 7 May 1969 p 246-256 refs (See N69-32044 18-05)  
 Avail: CFSTI CSCL 06S

The effect of a long (from 10 to 30 days) stay by two persons in a small pressure chamber (5 m<sup>2</sup>) was studied. Altogether 7 subjects took part in the experiments. The partial pressure of oxygen in the pressure chamber was maintained between 150 and 200 mm Hg, and of carbon dioxide between 2 and 14 mm Hg. The total gas pressure in the chamber (O<sub>2</sub>, CO<sub>2</sub>, N<sub>2</sub>, water vapor) corresponded to altitudes of 3000, 5000, and 7000 m. For each subject a specific program of daily activity was assigned. Frequency characteristics of the EEG were within limits of diurnal physiological variations. On the ECG the cardiac axis was displaced to the left (at an altitude of 7000 m). The pulse rose regularly, on the average by 10-15 beats/min, and excitability of the cardiovascular system was increased. Basal metabolism fell by 15-20%. The content of 17-hydroxycorticosteroids in the 24-hour urine increased. The serum albumin fraction was increased and the globulins decreased. A program based on waking at night was less favorable. Author

**N69-32069\*# Scripta Technica, Inc., Washington, D.C.**  
**EFFECT OF ADAPTATION TO HIGH MOUNTAIN CONDITIONS ON HUMAN RESISTANCE TO ACUTE HYPOXIA AND HIGH TEMPERATURE**

V. B. Malkin et al *In its Probl. of Space Biol.*, Vol. 7 May 1969 p 257-264 refs (See N69-32044 18-05)  
 Avail: CFSTI CSCL 06S

The effect of adaptation to high altitudes (2000-4200 m) on resistance to acute hypoxia and a high external environmental temperature (+70°) was studied in clinically healthy young men. After a stay in the mountains, an increase in the altitude ceiling was found in 13 of 15 subjects in the mountains for the first time when raised by degrees in the pressure chamber. The increase amounted to 1000-20,000 m. This effect was absent in mountaineers shown by a control investigation to possess high background resistance. After their return from the mountains most of the subjects showed a slight decrease in resistance to high external environmental temperatures. Author

**N69-32070\*# Scripta Technica, Inc., Washington, D.C.**  
**ADAPTATION TO HYPOXIA AS A MEANS OF INCREASING HUMAN RESISTANCE TO RADICAL ACCELERATION**

A. R. Kotovskaya et al *In its Probl. of Space Biol.*, Vol. 7 May 1969 p 265-269 refs (See N69-32044 18-05)  
 Avail: CFSTI CSCL 06S

The effect of adaptation to high altitudes on the resistance of 7 mountaineers and 8 persons not adapted to high altitudes to the action of radial accelerations (+C<sub>x</sub>) was studied during spinning on a centrifuge. After a stay in the mountains tolerance to overloads was increased in all the mountaineers and in 6 of the subjects undergoing adaptation for the first time. In one of two subjects showing no increase in tolerance to overloads, signs of mountain sickness developed during their stay in the mountains. Physiological reactions of the cardiovascular and respiratory systems of most of the hypoxia-adapted subjects to overloads were rather more marked than in the controls. The authors consider that the suggested method is effective enough for the purpose of increasing man's resistance to the action of overloads. Author

**N69-32071\*# Scripta Technica, Inc., Washington, D.C.**  
**CONTINUATION OF INVESTIGATIONS OF CHANGES IN OSMOTIC RESISTANCE OF ERYTHROCYTES DURING ACCLIMATIZATION TO HIGH MOUNTAIN CONDITIONS**

Z. I. Barbashova *In its Probl. of Space Biol.*, Vol. 7 May 1969 p 270-274 (See N69-32044 18-05)  
 Avail: CFSTI CSCL 06S

Cyclic changes in osmotic resistance of the erythrocytes in human blood were found during acclimatization in the mountains. On the first days after arrival in the mountains a significant increase in erythrocyte resistance was found in 25 of 26 subjects. Later during the stay the osmotic resistance of the erythrocytes became normal in most subjects, but rose again in the first days after descending to sea level. Author

**N69-32072\*# Scripta Technica, Inc., Washington, D.C.**  
**EFFECT OF HYPEROXIA ON DYNAMICS OF ERYTHROPOIESIS IN ANIMALS**

A. M. Shmeleva et al *In its Probl. of Space Biol.*, Vol. 7 May 1969 p 275-281 refs (See N69-32044 18-05)  
 Avail: CFSTI CSCL 06S

Experiments were performed on CC57W pure-line mice and Wistar rats. Under the influence of an oxygen-enriched atmosphere an increase in the reticulocyte count and a slight decrease in the erythrocyte count and hemoglobin level were found in the animal's blood. A long stay of the animals in the hyperoxic atmosphere caused a transient increase in the erythrocyte count. In the after-period the erythrocyte count fell and the acid resistance of the erythrocytes rose. Author

**N69-32073\*# Scripta Technica, Inc., Washington, D.C.**  
**POSSIBILITY OF REDUCING THE TOXIC ACTION OF CARBON DIOXIDE ON THE LIVING ORGANISM**

V. P. Zagryadskiy et al *In its Probl. of Space Biol.*, Vol. 7 May 1969 p 282-287 refs (See N69-32044 18-05)  
 Avail: CFSTI CSCL 06S

The possibility of reducing the toxic action of carbon dioxide on the body by increasing the percentage of oxygen in the inspired air, administration of a group of vitamins, and nonspecific training is discussed. Author

**N69-32074\*# Scripta Technica, Inc., Washington, D.C.**  
**HUMAN ADAPTATION TO TEMPERATURE CONDITIONS WITH THE OBJECT OF INCREASING RESISTANCE TO HEAT**

P. V. Buyanov et al *In its Probl. of Space Biol.*, Vol. 7 May 1969 p 288-295 refs (See N69-32044 18-05)  
 Avail: CFSTI CSCL 06S

Familiarizing procedures should be carried out in order to determine individual resistance to high temperatures. The use of specific methods of increasing heat resistance is not acceptable and is limited to the influence which they exert on vascular tone. Author

**N69-32075\*# Scripta Technica, Inc., Washington, D.C.**  
**STANDARDS FOR NOISE LEVELS IN CABINS OF SPACECRAFT DURING LONG-DURATION FLIGHTS**

Ye. M. Yuganov et al *In its Probl. of Space Biol.*, Vol. 7 May 1969 p 296-303 refs Presented at the 16th Intern. Astronautical Congr., Athens, 1965 (See N69-32044 18-05)  
 Avail: CFSTI CSCL 06S

A series of experiments was carried out to determine the effect of high-pitch (up to 3000 Hz) noise with a total level of 60-65 and 74-76 dB and exposure of between 8 h and 60 days on the human auditory analyzer. Isolation hypokinesia, and the conditions of work, rest, food, clothing, etc., were simulated. After an exposure of 8 h moderate fatigue of auditory function was noted, after exposure of 24 h a decrease in auditory sensitivity. Continuous exposure to noise (75 dB) for 30 days had an adverse effect on the CNS and the auditory analyzer. However, noise of 60-65 db, acting for 60 days, had no effect on the auditory analyzer. This value was recommended as permissible for spacecraft.

Author

**N69-32076\*#** Scripta Technica, Inc., Washington, D.C.  
**AUDITORY FUNCTION IN MAN AFTER A PERIOD OF SEVERAL DAYS IN AN ARTIFICIAL ATMOSPHERE**  
 Yu. V. Krylov *In its Probl. of Space Biol.*, Vol. 7 May 1969 p 304-306 refs (See N69-32044 18-05)  
 Avail: CFSTI CSCL 06S

The auditory function was investigated in human subjects staying many days at a lowered barometric pressure (308 mm Hg) with normal partial pressure of oxygen. They were exposed to an atmosphere containing up to 2% CO<sub>2</sub> and breathed a helium-oxygen mixture. No deviations exceeding the normal physiological variations were found during dynamic audiometry and investigation of the time of retrograde adaptation of hearing. The considerable resistance of the human auditory analyzer during a stay of many days in an artificial atmosphere was noted. Author

**N69-32077\*#** Scripta Technica, Inc., Washington, D.C.  
**BIOLOGICAL ACTION OF INTENSE WIDE BAND NOISE ON ANIMALS**  
 V. I. Ponomarev et al *In its Probl. of Space Biol.*, Vol. 7 May 1969 p 307-309 refs (See N69-32044 18-05)  
 Avail: CFSTI CSCL 06S

In animals repeatedly exposed to the brief (0.6 and 3.5 sec) action of wide-band noise with an intensity of more than 126 db, hemorrhages up to 3 mm in diameter were found in the lungs at necropsy. Microscopic examination of pieces of lung tissue with hemorrhages showed rupture of capillaries and larger vessels. The appearance of hemorrhages was preceded by emphysema of the marginal areas of lung tissue, which spread to the lateral surfaces of the lungs in the case of exposure to noise with an intensity exceeding 130-135 db, giving them a nodular appearance.

Author

**N69-32078\*#** Scripta Technica, Inc., Washington, D.C.  
**EFFECT OF SOUND ON ADRENOCORTICAL AND THYROID FUNCTION AND HIGHER NERVOUS ACTIVITY OF ALBINO RATS**  
 T. S. Barutkina et al *In its Probl. of Space Biol.*, Vol. 7 May 1969 p 310-316 refs (See N69-32044 18-05)  
 Avail: CFSTI CSCL 06S

Relatively low intensity sound measurements (70 db, pitch 650 Hz) were obtained over a long period of time, and the results indicated an increased adrenal and thyroid function and slight changes in higher nervous activity. All functional changes noted from the influence of acoustic stimulation were transient and can be attributed to body adaptation to the effects of stimuli. Author

**N69-32079\*#** Scripta Technica, Inc., Washington, D.C.  
**EFFECT OF HYPODYNAMIA ON NITROGEN METABOLISM AND IMPORTANCE OF GRADED PHYSICAL EXERCISES FOR MAINTENANCE OF THE NITROGEN BALANCE**

Yu. K. Syzrantsev *In its Probl. of Space Biol.*, Vol. 7 May 1969 p 317-322 refs (See N69-32044 18-05)  
 Avail: CFSTI CSCL 06S

A marked negative nitrogen balance is observed in a state of hypodynamia (strict confinement to bed, immersion in water). When human subjects are kept in small rooms, the nitrogen excretion in the urine is increased by 14%. The increased nitrogen excretion is evidence of a decrease in protein resynthesis and of some degree of muscle tissue atrophy, an unfavorable factor when the need arises for a change from hypodynamia to active muscular work. Physical exercises, with an energy cost of 400 kcal, restores the nitrogen balance.

Author

**N69-32080\*#** Scripta Technica, Inc., Washington, D.C.  
**EFFECT OF QUALITATIVE DIFFERENCES IN DIET ON METABOLISM IN HYPODYNAMIA**  
 Yu. F. Udalov et al *In its Probl. of Space Biol.*, Vol. 7 May 1969 p 323-329 refs (See N69-32044 18-05)  
 Avail: CFSTI CSCL 06S

Nitrogen, carbohydrate, lipid, mineral, and vitamin metabolism and energy were studied under conditions of restricted mobility for seven days in subjects receiving diets containing different food substances. The first diet consisted of: 120 g protein, of which 101 g was animal; 101.2 g fat; 297.2 g carbohydrate; and 2653 kcal total calorific value. The second contained: 57.4 protein, of which 56.6 g was animal; 67.1 g fat; 266 g carbohydrate; and 1951 kcal total calorific value. The changes in metabolism were less marked when diet two was given; the negative nitrogen balance was small, excretion of free amino acids in the urine was not increased by comparison with the period of unrestricted movement, and the protein assimilation was unchanged during hypodynamia. Diet two can therefore be recommended for use under hypodynamic conditions.

Author

**N69-32081\*#** Scripta Technica, Inc., Washington, D.C.  
**NUTRITIONAL STATE OF HUMAN SUBJECTS KEPT FOR LONG PERIODS IN A HORIZONTAL POSITION AND SUBSEQUENTLY EXPOSED TO ACCELERATION**  
 V. A. Petrovikh et al *In its Probl. of Space Biol.*, Vol. 7 May 1969 p 330-337 refs (See N69-32044 18-05)  
 Avail: CFSTI CSCL 06S

Some aspects of the feeding of subjects under hypodynamic conditions preceding exposure to overloads were studied in healthy persons for 10 and 15 days. The diet contained 125 g protein, 105 g fat, 307 g carbohydrates, and a 2745 kcal calorific value. No significant changes took place in enzyme function of the gastric glands. Excretion of urea, ammonia, amino acids, and uric acid in the urine was increased. The basal metabolism was slightly lowered. Indices of lipid metabolism and also the blood sugar were within normal limits. Some indices of acid-base balance remained within normal limits. Excretion of calcium and phosphorus in the urine was increased, while the B<sub>1</sub>, B<sub>2</sub> and B<sub>6</sub> vitamin supply was lowered. On the whole, the diet proved adequate in food value and principal food content for subjects under the specified conditions.

Author

**N69-32082\*#** Scripta Technica, Inc., Washington, D.C.  
**USE OF A BIOMASS OF UNICELLULAR ALGAE FOR HUMAN FEEDING**  
 Yu. I. Kondratyev et al *In its Probl. of Space Biol.*, Vol. 7 May 1969 p 338-343 refs (See N69-32044 18-05)  
 Avail: CFSTI CSCL 06S

Three investigations were carried out in which the diet of 12 volunteers included 50, 100, and 150 g dry biomass of

unicellular algae for 20–23 days. In the first investigation, 3 subjects were used; 4 in the second; and 5 in the third. No abnormality in the state of health of the subjects was found in the first two investigations. In the third, edema and petechial hemorrhages of the skin of the face, fingers, and toes of the right foot were observed. They developed at different times and differed in severity in different subjects, being absent in only one. These manifestations are evidently allergic in nature.

Author

**N69-32083\*# Scripta Technica, Inc., Washington, D.C.**  
**MATHEMATICAL METHOD FOR CALCULATING**  
**NECESSARY QUANTITY OF PRODUCTS FOR A GIVEN DIET**  
**USING A LIMITED ASSORTMENT OF PRODUCTS**

M. F. Fomin *In its Probl. of Space Biol.*, Vol. 7 May 1969  
 p 344–355 refs (See N69-32044 18-05)

Avail: CFSTI CSCL 06E

A method is described for calculating the quantities of individual products in the diet taken from a given assortment and for yielding the stipulated calorific value of the diet. In addition, stipulated ratios between the various products can be observed. Two examples of theoretical calculations of diets with stipulated ratios between proteins, fats and carbohydrates, and a stipulated calorific value, made up from a limited range of products, are given.

Author

**N69-32084\*# Scripta Technica, Inc., Washington, D.C.**  
**HETEROTROPHIC ORGANISMS AS A SOURCE FOR**  
**HUMAN CONSUMPTION DURING LONG SPACEFLIGHTS**

V. I. Yazdovskiy et al *In its Probl. of Space Biol.*, Vol. 7 May 1969  
 p 356–361 refs (See N69-32044 18-05)

Avail: CFSTI CSCL 06S

Several heterotrophic organisms are analyzed from the point of view of their inclusion in a closed ecological system. It is concluded that organisms from the class of the lower crustaceans (genera *Daphnia*, *Gammarus*), fishes (*Tilapia mossambica*), and birds are promising. As primary utilizers of organic matter, preference is given to activated sludge.

Author

**N69-32085\*# Scripta Technica, Inc., Washington, D.C.**  
**WATER SUPPLY FOR THE CREW DURING SPACEFLIGHTS**

A. A. Moiseyev et al *In its Probl. of Space Biol.*, Vol. 7 May 1969  
 p 362–372 refs (See N69-32044 18-05)

Avail: CFSTI CSCL 06S

Some aspects of the water supply for crew members of spacecraft are examined. Experimental data concerned with the further development of freeze-drying and catalytic-oxidation methods suggested previously for regenerating water from moisture-containing human metabolic products are presented. It is shown that water regenerated by these methods can be used for drinking purposes.

Author

**N69-32086\*# Scripta Technica, Inc., Washington, D.C.**  
**POSSIBLE USE OF WATER CONDENSED FROM A VIABLE**  
**CABIN ATMOSPHERE FOR DRINKING AND OTHER**  
**DIETARY PURPOSES**

V. S. Khalturin et al *In its Probl. of Space Biol.*, Vol. 7 May 1969  
 p 373–380 refs (See N69-32044 18-05)

Avail: CFSTI CSCL 06T

Results of a toxicologic investigation of the condensate of atmospheric water vapor of an airtight cabin, used by human subjects for long periods of stay, are described. The condensate may contain certain impurities having a harmful effect on the human body. After purification by adsorbents, the condensate is fit for use as drinking water.

Author

**N69-32087\*# Scripta Technica, Inc., Washington, D.C.**  
**WAYS AND MEANS OF REDUCING TO A MINIMUM**

**MICROFLORA IN SMALL ROOMS INTENDED FOR**  
**LONG-TERM EXPERIMENTS WITH SUBJECTS**

V. I. Vashkov et al *In its Probl. of Space Biol.*, Vol. 7 May 1969  
 p 381–385 (See N69-32044 18-05)

Avail: CFSTI CSCL 06I

A method of reducing microflora in small rooms is suggested. The bacterial population is reduced by applying a group of measures including disinfection of the room itself, treatment of soft articles, preparation of the subjects for the experiments, and precautionary measures for communication between subjects and experimenters.

Author

**N69-32088\*# Scripta Technica, Inc., Washington, D.C.**  
**INVESTIGATION OF THE STATE OF THE HUMAN SKIN**  
**AFTER PROLONGED RESTRICTION ON WASHING**

I. G. Popov et al *In its Probl. of Space Biol.*, Vol. 7 May 1969  
 p 386–392 (See N69-32044 18-05)

Avail: CFSTI CSCL 06S

Contamination and the condition of the skin and clothing materials of persons spending up to 60 days in closed rooms without washing the skin covered by clothing were studied. The degree of contamination of skin and clothing by products of the cutaneous glands was judged from accumulation of chlorides and organic substances. The mean contamination of clothing and skin per diem varied from 117 to 403 mg chlorine. Clothing absorbed about 90% of the chlorides and 80% of the organic substances. The pH moved toward the acid side. The level of bacterial contamination became stabilized in the third week. The bactericidal index of the skin fell to 60–70. Skin diseases were of the usual kind and did not interfere with work. Rational choice of hygienic parameters of the living environment can substantially reduce contamination of astronauts' skin and clothing and also reduce the frequency of hygienic treatment of the skin. The scalp, face, fingers, perineum and feet must be cleansed more often than other parts of the body.

Author

**N69-32089\*# Scripta Technica, Inc., Washington, D.C.**  
**ASTRONAUTS' BASIC REQUIREMENTS FOR PERSONAL**  
**HYGIENE MATERIALS**

V. V. Levashov et al *In its Probl. of Space Biol.*, Vol. 7 May 1969  
 p 393–396 (See N69-32044 18-05)

Avail: CFSTI CSCL 06I

Data are described showing the dynamics of human skin contamination during prolonged isolation. The connection between the chemical composition of the contaminants and the bacterial population of the skin surface is examined. On the basis of the results of long-term experiments, general medical and technical requirements relative to personal hygiene articles are specified.

Author

**N69-32090\*# Scripta Technica, Inc., Washington, D.C.**  
**OBJECTIVE EVALUATION OF DEODORIZING AND**  
**FRESHENING ACTION OF ORAL HYGIENE PREPARATIONS**  
**UNDER SPECIFIC CONDITIONS**

Yu. A. Federov *In its Probl. of Space Biol.*, Vol. 7 May 1969  
 p 397–399 refs (See N69-32044 18-05)

Avail: CFSTI CSCL 06I

Possible causes of mouth odors and their prevention are discussed. A method is suggested for studying various components of oral fluids to evaluate the deodorizing effectiveness of various hygienic preparations.

Author

**N69-32091\*# Scripta Technica, Inc., Washington, D.C.**  
**TOXIC GASEOUS SUBSTANCES LIBERATED FROM**  
**HUMAN FECES DURING STORAGE**

V. V. Kustov et al *In its Probl. of Space Biol.*, Vol. 7 May 1969  
 p 400–404 refs (See N69-32044 18-05)

Avail: CFSTI CSCL 06T

The principal gaseous toxic substances liberated during storage of human feces for 5 days were determined. Feces are a source of liberation of large amounts of ammonia and its compounds, hydrocarbons, fatty acids, phenols, oxides of nitrogen, carbon monoxide, hydrogen sulfide, indole, and other toxic substances into the surrounding medium. If feces are preserved with copper salt the liberation of ammonia and oxides of nitrogen is greatly reduced (by 4 and 10 times respectively) and that of carbon monoxide increased 10 times. It is suggested that the liberation of toxic substances from feces can be reduced if the preservative inhibits not only the microflora, but also oxidative processes.

Author

**N69-32092\*#** Scripta Technica, Inc., Washington, D.C.

**TOXIC GASEOUS SUBSTANCES LIBERATED FROM URINE DURING STORAGE**

V. V. Kustov et al. *In its Probl. of Space Biol.*, Vol. 7 May 1969 p 405-407 refs (See N69-32044 18-05)

Avail: CFSTI CSCL 06T

Fresh urine and urine preserved in closed containers are discussed as a potential source of pollution of the atmosphere of pressurized cabins liberating ammonia, aliphatic amines, phenols, mercaptans, hydrogen sulfide, fatty acids, carbon monoxide, and hydrocarbons.

Author

**N69-32093\*#** Scripta Technica, Inc., Washington, D.C.

**SEARCH FOR PREPARATIONS FOR PRESERVATION OF FECES FOR USE UNDER SPACE FLIGHT CONDITIONS**

L. N. Rogatina *In its Probl. of Space Biol.*, Vol. 7 May 1969 p 408-411 refs (See N69-32044 18-05)

Avail: CFSTI CSCL 07C

Of 24 preparations studied as preservatives of feces, 5 from the group of salts of heavy metals were chosen as suitable. In their efficacy they can be arranged in the following order: copper salt V, silver nitrate, silver sulfate, silver fluoride, and copper sulfate.

Author

**N69-32094\*#** Scripta Technica, Inc., Washington, D.C.

**MEDICAL PROVISION FOR LONG SPACE FLIGHTS**

G. L. Yaroshenko et al. *In its Probl. of Space Biol.*, Vol. 7 May 1969 p 412-415 ref (See N69-32044 18-05)

Avail: CFSTI CSCL 06E

In space flights the weight and dimensions of equipment in the spacecraft are limited. This applies also to medical supplies. The minimum level of medical supplies can be determined if the probable morbidity among the astronauts can be predicted. Diseases and disorders encountered among people taking part in long-term experiments or working under extreme conditions can serve as guidance for prediction. A method of calculating the statistical probability of illnesses during long space flights is suggested and the conclusions obtainable from its use are discussed.

Author

**N69-32095\*#** Scripta Technica, Inc., Washington, D.C.

**PHYSIOLOGICAL ASPECTS OF THE USE OF HYPOTHERMIA IN SPACE MEDICINE**

P. V. Vasilyev et al. *In its Probl. of Space Biol.*, Vol. 7 May 1969 p 416-422 refs (See N69-32044 18-05)

Avail: CFSTI CSCL 06F

Experimental data from a comparative physiological analysis of different methods of blocking protective and adaptive reactions during external air cooling of dogs and albino rats are described. The possible physiological mechanisms of the disturbance of homeostasis in a state of reversible, prolonged artificial hypothermia are examined. Some promising ways in which effective methods of blocking the thermoregulatory mechanism in animals may be sought are outlined. The aims of artificial hypothermia in long space flights are enunciated and some essentials of methods used to produce it are stated.

Author

**N69-32096\*#** Scripta Technica, Inc., Washington, D.C.

**RESULTS OF PHYSIOLOGICAL AND ECOLOGICAL INVESTIGATIONS OF CHLORELLA CULTURES AS A LINK IN A CLOSED ECOLOGICAL SYSTEM**

Ye. Ya. Shepelev et al. *In its Probl. of Space Biol.*, Vol. 7 May 1969 p 423-431 refs Presented at the 16th Intern. Astronaut. Congr., Athens, 1965 (See N69-32044 18-05)

Avail: CFSTI CSCL 06C

A brief survey of the results of combined investigations of a *Chlorella* culture as the possible basis for construction of photosynthetic reactors or as one of the links of a closed ecological system is given. Data showing the principal conditions for highly productive cultivation of algae are presented (balance of mineral food elements in the nutrient medium and cells, gas exchange of the culture, mineral and biochemical composition of biomass, etc.). The principal results of an investigation of the dynamic characteristics of algal suspensions for spontaneous and photodependent fluctuations in productivity are also given.

Author

**N69-32097\*#** Scripta Technica, Inc., Washington, D.C.

**BIOTECHNICAL SYSTEM OF AUTOMATIC CONTROL OF PHOTOSYNTHESIS**

M. A. Khvedelidze et al. *In its Probl. of Space Biol.*, Vol. 7 May 1969 p 432-440 refs (See N69-32044 18-05)

Avail: CFSTI CSCL 05E

In a biotechnical system, *Chlorella* suspension—source of light, a feedback is used to regulate the periods of light and darkness applied to the *Chlorella* suspension, based on the magnitude of the photoelectrochemical current. Discrete automatic control over the luminous flux and recording of the light-darkness period are carried out by means of a type N-373 automatic writer, modified for the purpose and included in an amperometric circuit for measuring intensity of O<sub>2</sub> output during photosynthesis. An optoelectrical automation system is added inside the instrument. Preliminary results of investigation of such a biotechnical system are described.

Author

**N69-32098\*#** Scripta Technica, Inc., Washington, D.C.

**STUDY OF PHOTOSYNTHESIS OF CHLORELLA GROWN UNDER CONSTANT CONDITIONS**

I. V. Aleksandrova et al. *In its Probl. of Space Biol.*, Vol. 7 May 1969 p 441-446 refs (See N69-32044 18-05)

Avail: CFSTI CSCL 06C

Experimental data obtained with an apparatus for cultivation of *Chlorella* under stable conditions of growth showed that the probability of appearance of spontaneous changes in intensity of photosynthesis is 0.18. The mean value of deviations of photosynthesis is 21%. Changes take place at the rate of 6%-7%/hour. It is concluded that continuous control of photosynthesis can be replaced by intermittent.

Author

**N69-32099\*#** Scripta Technica, Inc., Washington, D.C.

**EFFECT OF SOME GASEOUS CONTAMINANTS IN THE ATMOSPHERE ON PHOTOSYNTHETIC ACTIVITY OF CHLORELLA**

M. M. Korotayev et al. *In its Probl. of Space Biol.*, Vol. 7 May 1969 p 447-452 refs (See N69-32044 18-05)

Avail: CFSTI CSCL 06C

The effect of certain gaseous contaminants of the living atmosphere on the photosynthetic activity of *Chlorella* was studied. It was found that during the isolated action of low concentration of ammonia, carbon monoxide and acetone the mean CO<sub>2</sub> assimilation by the algal cells increased, whereas under the influence of hydrogen sulfide and human expired air it was decreased.

Author

**N69-32100\*#** Scripta Technica, Inc., Washington, D.C.

**CHARACTERISTICS OF GROWTH AND GAS EXCHANGE OF THE ALGA ANACYSTIS NIDULANS IN INTENSIVE CULTURE**

T. B. Galkina et al *In its* Probl. of Space Biol., Vol. 7 May 1969 p 453-458 refs (See N69-32044 18-05)  
 Avail: CFSTI CSCL 06C

Experimental data for the rate of growth of the biomass, CO<sub>2</sub> assimilation and oxygen liberation, pH dynamics, and pattern of nitrogen extraction from the medium by algae *Anacystis nidulans* in intensive accumulative culture are given. The coefficient of assimilation and chemical composition of the biomass were investigated and found to be close to those of *Chlorella*. The specific photosynthetic productivity of the culture of *A. nidulans* under intensive conditions is similar to the productivity of the *Chlorella* culture. Author

**N69-32101\*# Scripta Technica, Inc., Washington, D.C.**  
**CHOICE OF ANIMAL COMPONENTS OF CLOSED ECOLOGICAL SYSTEMS**

N. V. Mironova *In its* Probl. of Space Biol., Vol. 7 May 1969 p 459-470 refs (See N69-32044 18-05)  
 Avail: CFSTI CSCL 06C

The paper describes an attempt to analyze the possibility of using *Tilapia mossambica* Peters for this purpose as an aquatic variant of a closed ecological system. The results of the investigation show that tilapias are tolerant to the conditions of existence, can exist in high stocking density, can utilize a wide range of both animal and plant foods. They reproduce frequently, look after their young, and the survival rate of the young is high, indicating the possibility of a rapid increase in population. The comparatively rapid rate of growth suggests that a high rate of increase of total biomass can be expected. Author

**N69-32102\*# Scripta Technica, Inc., Washington, D.C.**  
**EFFECT OF FOOD SUPPLY ON GROWTH OF TILAPIA (TILAPIA MOSSAMBICA PETERS)**

N. V. Mironova *In its* Probl. of Space Biol., Vol. 7 May 1969 p 471-477 (See N69-32044 18-05)  
 Avail: CFSTI CSCL 06C

Tilapias can utilize the green mass of higher plants from 2 to 7 months of age. They can live and grow when fed for a long period (up to 5 months in the experiments) on a purely plant diet, even if it consists of plants of only one species. A small addition by weight of animal food considerably increases the rate of growth of the fish compared with that of fish receiving a purely vegetable diet. Author

**N69-32103\*# Scripta Technica, Inc., Washington, D.C.**  
**COMPARISON OF GROWTH OF TILAPIAS (TILAPIA MOSSAMBICA PETERS) WHEN FED ON CHLORELLA AND OTHER FOODSTUFFS**

N. V. Mironova *In its* Probl. of Space Biol., Vol. 7 May 1969 p 478-484 (See N69-32044 18-05)  
 Avail: CFSTI CSCL 06C

*Chlorella* is considered to be a first class, balanced food for growth of tilapias. In mean weight and utilization of food for growth the fish very closely resemble tilapias receiving animal food and give the highest growth indices, by contrast with fish receiving only higher plants. Author

**N69-32104\*# Scripta Technica, Inc., Washington, D.C.**  
**EFFECT OF VIBRATION AND LINEAR ACCELERATIONS ON FISH**

V. Ya. Mamontov et al *In its* Probl. of Space Biol., Vol. 7 May 1969 p 485-492 refs (See N69-32044 18-05)  
 Avail: CFSTI CSCL 06S

Vibrations of different frequencies, but with equal vibro-overloads (about 10 units) and equal exposure time (6 min) produce effects of different intensity on fish. Frequencies of 80-90 Hz had the strongest action, sometimes lethal, on fish weighing from 40 to 130 g and measuring from 16 to 21 cm in length.

The existence of resonance effects for this frequency band and for fish of this size is postulated. Author

**N69-32105\*# Scripta Technica, Inc., Washington, D.C.**  
**ACTION OF  $\gamma$ -RAYS AND PROTONS ON CHLORELLA**

I. D. Anikeyeva et al *In its* Probl. of Space Biol., Vol. 7 May 1969 p 493-495 refs (See N69-32044 18-05)  
 Avail: CFSTI CSCL 06R

Survival and mutation rates of the unicellular alga *Chlorella* strain LARG-1 as a function of dose were studied during exposure to Co<sup>60</sup>  $\gamma$ -rays and 660 MeV protons. The relative biological effect for protons is 7.2 krad and for  $\gamma$ -rays 11.5 krad (1.6:1 in favor of protons). The number of visible mutations increases proportionally to the dose of protons and  $\gamma$ -rays. The  $\gamma$ -rays give 7.8% of mutations and protons 3.7%, indicating the high mutagenic effect of  $\gamma$ -rays relative to their lethal action. Author

**N69-32106\*# Scripta Technica, Inc., Washington, D.C.**  
**STUDY OF REGENERATION OF AIR AND WATER BY HIGHER PLANTS IN A CLOSED SPACE**

N. T. Nilovskaya et al *In its* Probl. of Space Biol., Vol. 7 May 1969 p 496-506 refs (See N69-32044 18-05)  
 Avail: CFSTI CSCL 06C

Carbon dioxide assimilation by most of the experimental plants (Chinese and ordinary cabbage, potato, beans, radish) varies between 50 and 60 g/m<sup>2</sup> area sown/day. Highest intensity of CO<sub>2</sub> assimilation is given by beetroot, sugarbeet and soybean (102-152 g/m<sup>2</sup> area sown/day). Assimilation of CO<sub>2</sub> by the crops fluctuates during the 24-hour period. Between 12 noon and 3 P.M. depression of CO<sub>2</sub> assimilation is observed. During the period of darkness the plants excrete 3-8.5 g CO<sub>2</sub> per square meter sown area, or 4%-7% of the daytime CO<sub>2</sub> assimilation. The intensity of transpiration of the plants under the experimental conditions is 19-40 g/square meter of leaf surface, giving a yield of 1.5-2.5 liters water/square meter leaf area. Author

**N69-32131\*# Aztec School of Languages, Inc., Maynard, Mass.**  
 Research Translation Div.

**PROBLEMS OF SPACE BIOLOGY. VOLUME 8: ADAPTATION TO HYPOXIA AND RESISTANCE OF AN ORGANISM [PROBLEMY KOSMICHESKOY BIOLOGII. TOM 8: ADAPTATSIYA K GIPOKSII I USTOYCHIVOST ORGANIZMA]**

Chernigovskiy, ed. Washington NASA Jul. 1969 p 255 refs Transl. into ENGLISH from Nauka Press (Moscow), 1968 p 5-146, 151-157, 166-181, 188-211, 230-243, 254-261 (Contract NASw-1692)  
 (NASA-TT-F-580) Avail: CFSTI CSCL 06S

Data are presented on the adaptation of animal and human organisms to lowered barometric pressure, under natural and simulated high altitude conditions; behavioral characteristics of first-time and experienced mountain climbers; and the role of physical exercise in adaptation to hypoxia. For individual titles, see N69-32132 through N69-32158.

**N69-32132\*# Aztec School of Languages, Inc., Maynard, Mass.**  
 Research Translation Div.

**ACCLIMATIZATION TO LOWERED BAROMETRIC PRESSURE AS A MEANS OF INCREASING RESISTANCE TO VARIOUS EXTREME FACTORS**

*In its* Probl. of Space Biol., Vol. 8 Jul. 1969 p 1-6 (See N69-32131 18-04)  
 Avail: CFSTI 06S

An introductory discussion of acclimatization problems of the biologically stressed organism emphasizes the breadth of interest in these problems. Training for oxygen deficiency and methods of raising the biological adaptation potential are supported by past

programs and experiences in athletic physiology, aviation and space medicine, and high altitude physiology. As the first lengthy study with a rational scientific basis, how to conduct high altitude or pressure training, and how to produce physiological hypoxia were basic questions to the investigations. The rationale for both human and animal experimental study was demonstrated by the results to lowered barometric pressure conditions when control centers of the endocrinological system were surgically removed. M.H.E.

**N69-32133\*#** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

**THE EFFECT OF PRELIMINARY ACCLIMATIZATION IN MOUNTAINS ON MAN'S ENDURANCE OF TRANSVERSE G-LOADS**

A. R. Kotovskaya, P. V. Vasil'yev, R. A. Vartbaronov, and S. F. Simpura *In its Probl. of Space Biol.*, Vol. 8 Jul. 1969 p 7-16 refs (See N69-32131 18-04)

Avail: CFSTI CSCL 06S

In investigations on humans, the effect was studied of a 1-5 month residence under high-altitude conditions on their resistance to the effect of transversely directed G-loads (+G<sub>x</sub>). The experiments were conducted on mountain climbers and on persons who had not been adapted to hypoxia. It was established that residence under high-altitude conditions produced an expansion of the functional potentialities of the organism and guaranteed a significant increase in its resistance to the effect of G-loads. The increase in resistance to G-loads was +1.7 on the average. The authors consider it feasible to use this method for increasing the resistance of an organism for the practical purposes of preflight training of astronauts. Author

**N69-32134\*#** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

**PHYSIOLOGICAL REACTIONS OF MAN TO THE EFFECT OF TRANSVERSE G-LOADS AFTER ADAPTATION TO HIGH-ALTITUDE CONDITIONS**

A. R. Kotovskaya, R. A. Vartbaronov, and S. F. Simpura *In its Probl. of Space Biol.*, Vol. 8 Jul. 1969 p 17-40 refs (See N69-32131 18-04)

Avail: CFSTI CSCL 06S

In investigations on humans the effect was studied of a 1 to 5 month residence under high altitude conditions on the physiological reactions of man acted on by transverse G-loads (+G<sub>x</sub>); the experiments were conducted on mountain climbers and on persons who had not been adapted to hypoxia. EKG's and EEG's were measured as well as blood pressure, respiration rate, respiration and gas exchange as well as the time of motor reaction to light signals. The authors showed that residence under high altitude conditions produced an expansion of the functional potentialities of the organism, thus guaranteeing a significant increase in its resistance to the effect of G-loads. The positive effects of acclimatization to hypoxia were revealed in numerous cardiovascular and respiratory readings. Author

**N69-32135\*#** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

**THE EFFECT OF ADAPTATION TO HYPOXIA UNDER PRESSURE-CHAMBER CONDITIONS ON TOLERANCE TO TRANSVERSE G-LOADS**

A. R. Kotovskaya, R. A. Vartbaronov, F. V. Babchinskiy, and S. F. Simpura *In its Probl. of Space Biol.*, Vol. 8 Jul. 1969 p 41-49 refs (See N69-32131 18-04)

Avail: CFSTI CSCL 06S

The effect of intermittent conditioning to hypoxia was studied in a pressure chamber on the tolerance of man to transverse G loads. The conditioning was carried out by successive ascents every 3-7 days to altitudes of 4000 to 7000 m with rest periods at each altitude for 30 minutes. The duration of the training schedule was 20-25 days. It was established that after

pressure-chamber conditioning, an increase is noted in tolerance to G loads, which on the average is +1.35. The increase in tolerance to G loads after conditioning in a pressure chamber was less than after high altitude training. It was proposed that adaptation to hypoxia may be used for purposes of preflight training and for increasing tolerance of the astronaut during prolonged flight before returning to earth. Author

**N69-32136\*#** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

**CHARACTERISTICS OF DEVELOPMENT OF THE ADAPTATION SYNDROME TO ACUTE HYPOXIA IN MOUNTAIN CLIMBERS**

V. B. Maclin N. M. Asyamolova, and A. K. Kochetov *In its Probl. of Space Biol.*, Vol. 8 Jul. 1969 p 50-59 refs (See N69-32131 18-04)

Avail: CFSTI CSCL 06S

A study was made with 19 highly-qualified mountain climbers and 20 healthy young men as a control group. In all of the subjects the altitude tolerance was determined by gradual ascent in a pressure chamber. A greater high altitude tolerance was found in the mountain climbers in comparison with the control group. Here attention was paid to the fact that in the majority of mountain climbers at high-altitude there was an increase in pulmonary ventilation which was considerably greater than in those comprising the control group. The reaction characteristics of respiration, and the cardiovascular and central nervous systems, in the mountain climbers have been described in the course of ascending to 7000 to 9000 m in the pressure chamber. Author

**N69-32137\*#** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

**THE EFFECT OF ADAPTATION TO HIGH ALTITUDE ON MAN'S TOLERANCE OF ACUTE HYPOXIA, HIGH TEMPERATURE AND VESTIBULAR IRRITATIONS**

V. B. Malkin, G. D. Yukhnovskiy, and S. S. Markaryan *In its Probl. of Space Biol.*, Vol. 8 Jul. 1969 p 60-68 refs (See N69-32131 18-04)

Avail: CFSTI CSCL 06S

In three different groups (mountain climbers, physically trained men and scientific staff) the tolerance of acute hypoxic hypoxia, high temperature and vestibular irritations was investigated before and after residence in mountains. The increase in tolerance to acute hypoxia in the majority of persons living for the first time under high altitude conditions was established. The tolerance to elevated temperature after residence in the mountains was lowered insignificantly and the tolerance to vestibular irritations was somewhat increased. Author

**N69-32138\*#** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

**EFFECT OF REPEATED RESIDENCE IN MOUNTAINS ON THE TOLERANCE OF MOUNTAIN CLIMBERS TO ACUTE HYPOXIA**

N. M. Asyamolova and V. B. Malkin *In its Probl. of Space Biol.*, Vol. 8 Jul. 1969 p 69-75 refs (See N69-32131 18-04)

Avail: CFSTI CSCL 06S

This research was conducted with 12 mountain climbers who were master athletes. Before and after the high altitude expedition in the region of Tyan'-Shan' (maximum altitude 6995 m) their altitude tolerance was determined under conditions of gradual ascent in a pressure chamber and their blood was examined. It was established that a visit of 5 to 6 weeks by the mountain climbers who had previously participated numerous times in high altitude ascents, produces a relatively insignificant increase in their tolerance to acute hypoxia. No correlation was established between the increase in altitude ceiling and changes in the blood by the increase in the number of erythrocytes and the hemoglobin. Author

**N69-32139\*#** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

**TOLERANCE OF ANIMALS TO HYPEROXIA, HYPERCAPNIA AND HIGH TEMPERATURE AFTER ADAPTATION TO LOWERED BAROMETRIC PRESSURE**

F. V. Babchinskiy, V. B. Malkin, and G. D. Yukhnovskiy *In its Probl. of Space Biol.*, Vol. 8 Jul. 1969 p 76-83 refs (See N69-32131 18-04)

Avail: CFSTI CSCL 06S

Research was conducted on white mice. The tolerance of the animals was studied according to their survival in conditions of a gaseous atmosphere containing 96% oxygen with an elevated amount of CO<sub>2</sub> (40%) and high temperature (50-60%) before and after adaptation to conditions of lowered barometric pressure. It was established that adaptation to hypoxia will not result in an increase in the tolerance of animals to the effect of hyperoxia and high CO<sub>2</sub> concentration in the inhaled air. The tolerance to high temperature in the adapted animals increases slightly. Author

**N69-32140\*#** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

**EFFECT OF ADAPTATION TO LOWERED BAROMETRIC PRESSURE ON TOLERANCE OF HYPOCAPNIA**

A. K. Kochetov *In its Probl. of Space Biol.*, Vol. 8 Jul. 1969 p 84-89 refs (See N69-32131 18-04)

Avail: CFSTI CSCL 06S

Twenty-four subjects participated in the research, of which 12 were mountain climbers. The hypocapnic state was induced at normal barometric pressure by the method of voluntary hyperventilation. The EEG's, EKG's blood pressure and pCO<sub>2</sub> in alveolar air were recorded. It was shown that mountain climbers are more tolerant of hypocapnia than those subjects who have not been conditioned to high altitude. Thus, in subjects of the control group, the average increase in frequency of heart contractions was 12% greater than in the mountain climbers. Stronger changes were observed on the EEG in comparison with mountain climbers in spite of the fact that in these latter the pCO<sub>2</sub> in alveolar air was reduced to lower values. No substantial difference was found in the reactions of the blood pressure. Author

**N69-32141\*#** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

**THE TOLERANCE OF ANIMALS TO ACUTE HYPOXIA AFTER CONDITIONING TO PHYSICAL LOADS UNDER HIGH-ALTITUDE CONDITIONS**

Ye. V. Loginova *In its Probl. of Space Biol.*, Vol. 8 Jul. 1969 p 90-100 refs (See N69-32131 18-04)

Avail: CFSTI CSCL 06S

Research was conducted on white mice and rats. The mice were conditioned to both static (hanging on poles) and dynamic (running on a treadmill) work, the rats only to dynamic. The conditioning was carried out under middle-altitude conditions (altitude of 2000 m). The changes in weight of the animals, number of erythrocytes, the amount of hemoglobin, the oxygen requirements and the lifetime at altitudes of 9000 to 12,000 m were determined. It was found that conditioning to dynamic work under middle-altitude conditions slightly increases the tolerance of rats of acute hypoxia: such conditioning to static loads under these same conditions does not affect the tolerance of the organism to acute hypoxia. Author

**N69-32142\*#** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

**MUTUAL EFFECTS OF CONDITIONING TO PHYSICAL LOADS AND ADAPTATION TO HYPOXIC HYPOXIA**

Ye. V. Loginova *In its Probl. of Space Biol.*, Vol. 8 Jul. 1969 p 101-104 (See N69-32131 18-04)

Avail: CFSTI CSCL 06S

Research was conducted on white rats. The animals were conditioned in running on a treadmill under ordinary atmospheric

conditions under middle-altitude conditions and under atmospheric conditions with parallel interrupted adaptation of the rats to hypoxia under pressure chamber conditions. Studied were the changes in weight of the animals, the number of erythrocytes, amount of hemoglobin and life time of the animals under conditions of acute hypoxia. It was established that the isolated effect of only one conditioning to physical loads and even the parallel effect of conditioning to physical loads and adaptation to hypoxia did not lead to an increase in the tolerance of acute hypoxia. An increase was observed only with conditioning under middle altitude conditions. Author

**N69-32143\*#** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

**THE EFFECT OF PROLONGED STAY UNDER CONDITIONS OF LOWERED BAROMETRIC PRESSURE ON TOLERANCE OF G-LOADS**

N. N. Uglova *In its Probl. of Space Biol.*, Vol. 8 Jul. 1969 p 105-111 refs (See N69-32131 18-04)

Avail: CFSTI CSCL 06S

In experiments on white mice, rats and guinea pigs studied was the effectiveness of the influence of adaptation to hypoxia on the tolerance of transversely directed G-loads. It was established that both an interrupted 14-day pressure chamber adaptation to hypoxia with evacuation from 528.5 to 307 mm Hg and a 30-day acclimatization under high altitude conditions (Mt. Elbrus) at an altitude of 2000 to 3800 m produces an increase in the survivability under the influence of G-loads of adapted mice on an average of 25%, in rats of 19%, in guinea pigs of 30%. Here it was noted that the adaptation effect is retained approximately for a period of 3 weeks. Both types of conditioning are accompanied by an increase in the amount of hemoglobin and number of erythrocytes in the peripheral blood of the animals. Author

**N69-32144\*#** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

**THE EFFECT OF PRELIMINARY INTERRUPTED STAY IN A RAREFIED ATMOSPHERE ON THE TOLERANCE OF RATS TO TRANSVERSE G-LOADS**

V. G. Petrukhin *In its Probl. of Space Biol.*, Vol. 8 Jul. 1969 p 112-118 refs (See N69-32131 18-04)

Avail: CFSTI CSCL 06S

For a period of 23 days white rats were placed in a rarefied atmosphere after which they were subjected to the effect of transverse G-loads. The conditioned rats showed a higher level of tolerance to transverse G-loads. Statistically reliable findings showed relative weight increases in the adrenal glands and heart, hemorrhages were more often encountered in the lungs, glycogen was retained in large amount in the liver; dystrophic and necrobiotic changes in the muscular fibers of the myocardium were found in a smaller amount than in the unconditioned animals. Favorable effects of conditioning were an increase in the tolerance of the organism to insufficient supply of oxygen to the tissues and an improvement in the oxygen supply to the vital organs, an increase in erythropoiesis, and an increase in the ability of the myocardium to carry on physical work. Author

**N69-32145\*#** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

**THE EFFECT OF ADAPTATION TO CONDITIONS OF A CHANGED GASEOUS ENVIRONMENT ON TOLERANCE TO G-LOADS**

P. V. Vasil'yev and N. N. Uglova *In its Probl. of Space Biol.*, Vol. 8 Jul. 1969 p 119-133 refs (See N69-32131 18-04)

Avail: CFSTI CSCL 06S

Cited are experimental data on the results of investigating white mice and rats in a study of the influence of prolonged stay under conditions of changed gaseous environment on tolerance of the organism to G-loads. It was shown that breathing for 6 hours

a day for a period of 14 days of a hypercapnic gas mixture does not substantially change tolerance to G-loads, but breathing a hypoxic mixture or a hypoxic and hypercapnic mixture increases it significantly. It was established that hypercapnia slows down the erythrocytic reaction to oxygen deficiency. A suggestion is made concerning the possible physiological mechanisms of these peculiar reactions. Author

**N69-32146\*#** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

**A COMPARATIVE EVALUATION OF THE EFFECTIVENESS OF DIFFERENT SCHEDULES OF ADAPTATION TO HYPOXIA**

P. V. Vasil'ev, V. B. Malkin, F. V. Babchinskiy, Ye. V. Loginova, N. A. Roshchina et al. *In its Probl. of Space Biol.*, Vol. 8 Jul. 1969 p 134-141 refs (See N69-32131 18-04)

Avail: CFSTI CSCL06S

Based on data from changes in the animals' weight, the number of erythrocytes, the amount of hemoglobin, oxygen requirements and survival of mice at high altitudes, a comparative evaluation of the natural-high-altitude and pressure chamber adaptations are given. It was established that the adaptation effect, found as a result of animals remaining at high altitudes and in a pressure chamber at these same altitudes and with the same exposure, does not change appreciably. Under pressure chamber conditions schedules were set up for which the adaptation is carried out with a gradual increase in altitude up to relatively high values with a significant variation in the barometric pressure during the course of the days. Author

**N69-32147\*#** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

**THE EFFECT OF HYPOXIA ON THE CONDITION OF DEFENSE MECHANISMS OF THE ORGANISM OF A MOUSE**

A. S. Kaplanskiy, G. N. Durnova, and N. A. Roshchina *In its Probl. of Space Biol.*, Vol. 8 Jul. 1969 p 142-151 refs (See N69-32131 18-04)

Avail: CFSTI CSCL06S

The condition of the cellular and the humoral immunity, the characteristics of the immunomorphological reactions in the lymphoid organs, and the subcutaneous tissue at the injection site of the antigen in mice who were subjected to lowered atmospheric pressure were studied. No deviations in the cellular or humoral immunity was observed; the character of the immunomorphological reaction which develops in the subcutaneous tissue does not change at the site of the injection or of the regional lymph nodes. In animals who were immunized after completion of the typhoid vaccine experiment, there was noted a decrease in the production of antibodies, a decrease in the amount of glycogen in the neutrophils infiltrating the tissues at the site of injection of the antigen, and a decrease in the reactive changes from the side of the light centers of lymphoid follicles of the regional lymph nodes. Author

**N69-32148\*#** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

**THE SIGNIFICANCE OF CERTAIN CONTROL SYSTEMS IN DEVELOPING ADAPTATION TO HYPOXIA**

V. B. Malkin *In its Probl. of Space Biol.*, Vol. 8 Jul. 1969 p 152-159 refs (See N69-32131 18-04)

Avail: CFSTI CSCL06S

The role of the cerebral cortex, the cerebellar cortex, the adrenal cortex and the pituitary in the process of adaptation of an organism to a moderate degree of hypoxia was studied. It was shown that removing the cortex of one and two of the major hemispheres will lead to a significant increase in the tolerance of animals to acute hypoxia, in which case the adaptation of such animals to moderate hypoxia will exert no substantial influence on altitude tolerance. Removal of the cerebellar cortex reduces the tolerance of animals to acute hypoxia. After adaptation of the animals

to hypoxia the removal of the adrenal cortex is not accompanied by a complete disappearance of the adaptation effect; the altitude tolerance remains higher than in the intact animals. Author

**N69-32149\*#** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

**THE ROLE OF CERTAIN SUBCORTICAL FORMATIONS IN THE DEVELOPMENT OF ADAPTATION TO OXYGEN DEFICIENCY**

N. Z. Epshteyn *In its Probl. of Space Biol.*, Vol. 8 Jul. 1969 p 160-163 (See N69-32131 18-04)

Avail: CFSTI CSCL06S

In white mice before and after adaptation to chronic hypoxia, disorders occurred in the various subcortical formations of the brain. It was shown that disorders in the reticular formation of the pons with encroachment by the nucleus reticularis tegmenti both before and after adaptation promotes an increase in the survival of rats at an altitude of 12,500 m. Disorders in the brain in the region of the ventromedial thalamus and of the posterior hypothalamus promotes an increase in the tolerance of animals to acute hypoxia. Disorders in the region of the anterior hypothalamus before adaptation of the animals increases their altitude tolerance and after adaptation, lowers it. Author

**N69-32150\*#** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

**THE ROLE OF THE ADRENAL GLANDS IN THE DEVELOPMENT OF ADAPTATION TO HYPOXIA**

N. A. Roshchina *In its Probl. of Space Biol.*, Vol. 8 Jul. 1969 p 165-172 refs (See N69-32131 18-04)

Avail: CFSTI CSCL06S

The problem of the significance of the adrenal gland in the process of adaptation of animals to hypoxia was studied. The experiments were set up on white rats. The adaptation of animals who have undergone adrenalectomy and intact animals was carried out at high altitudes and in a pressure chamber. In the rats, the red blood, the weight, and the altitude tolerance were investigated. Animals with the adrenal glands removed can be adapted to conditions of the atmosphere with a lowered amount of oxygen. In this case the adaptation change in the animals who had undergone adrenalectomy are similar to the changes detected in the intact animals. Author

**N69-32151\*#** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

**THE SIGNIFICANCE OF THE PITUITARY IN THE DEVELOPMENT OF ADAPTATION TO HYPOXIA**

N. A. Roshchina *In its Probl. of Space Biol.*, Vol. 8 Jul. 1969 p 174-179 refs (See N69-32131 18-04)

Avail: CFSTI CSCL06S

The role of the pituitary in the process of adaptation of rats to hypoxia is studied. The experiments were carried out on white rats both intact and hypophysectomized. The adaptation of the animal to hypoxia was carried out in the mountains at altitudes of 2000-3800 m. In the animals, the red blood, the weight, and the altitude tolerance during ascent in a pressure chamber were assessed. The investigation showed that in the hypophysectomized animals the altitude tolerance to acute hypoxia is increased on a background of progressive anemia. Removal of the pituitary does not essentially change the altitude tolerance of the animals who were operated on in comparison with the intact animals. Author

**N69-32152\*#** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

**DYNAMICS OF CHANGE IN THE OSMOTIC RESISTANCE OF ERYTHROCYTES IN HUMANS AND IN ANIMALS DURING THE PERIOD OF NATURAL ACCLIMATIZATION TO HIGH ALTITUDE**



Z. I. Barbashova and G. I. Grigor'yeva *In its Probl. of Space Biol.*, Vol. 8 Jul. 1969 p 180-190 refs (See N69-32131 18-04)  
 Avail: CFSTI CSCL 06S

The osmotic resistance of erythrocytes in humans and in animals in the process of adaptation to high altitudes was investigated. Fifteen persons and 45 rats were studied during their time of residence at an altitude of 2000-5635 m. The increase in the osmotic resistance is noted in persons during active high-altitude acclimatization and correlates with the increase in the overall tolerance of the organism to acute hypoxia and G-loads. In the absence of any special physical conditioning no regular change is observed. In animals the increase in the osmotic resistance also correlates with the increase in the overall resistance of the organism. In this case, no regularity was found between the changes in the osmotic resistance and the morphological composition of the blood either in persons or in the animals. Author

**N69-32153\*\*** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

**REPEATED EXPOSURE AT HIGH ALTITUDE AS A METHOD OF REVEALING LATENT TRACES OF ADAPTATION TO HYPOXIA**

Ye. V. Loginova *In its Probl. of Space Biol.*, Vol. 8 Jul. 1969 p 192-203 refs (See N69-32131 18-04)  
 Avail: CFSTI CSCL 06S

This work was carried out on white mice and rats. The resulting phenomena were determined from the change in weight of the animals, the number of erythrocytes, the amount of hemoglobin, the oxygen requirements, and the lifetime of the animals at high altitudes following single and repeated adaptation. The adaptation was interrupted; six hours per day for a period of 13 days at altitudes of 3000-7000 m. In the animals following residence at high altitude even after normalization of the number of erythrocytes, the amount of hemoglobin, and other characteristics, the latent trace reactions remain from the previous adaptation. Author

**N69-32154\*\*** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

**DURATION OF THE REACTION OF THE MEDULLA OSSIMUM TO ACCLIMATIZATION TO HYPOXIA**

N. P. Blagovestova, Ye. V. Loginova, Ye. Ye. Simonov, and M. M. Fomenko *In its Probl. of Space Biol.*, Vol. 8 Jul. 1969 p 204-210 refs (See N69-32131 18-04)  
 Avail: CFSTI CSCL 06S

In the high-altitude and pressure-chamber experiments, the duration of the hemopoietic reaction in rats under various schedules of acclimatization to hypoxia was studied. The hemopoietic condition based on the change in the rate of proliferation of the medulla osseous elements, evaluated using the indices and the variation curves of the amount of DNA in the cellular nuclei was assessed. The amount of DNA was studied as a sign of the intensity of the synthetic processes which are the basis of preparing the cell for division. These investigations show that prolonged single and repeated residence of animals under conditions of lowered barometric pressure, corresponding to altitudes of 2000-7000 m above sea level, produce a significant increase in the amount of DNA-synthesized cells. Author

**N69-32155\*\*** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

**THE MECHANISM OF ADAPTING WHITE MICE TO A HYPERCAPNIC GASEOUS ENVIRONMENT**

V. Ye. Belay, P. B. Vasil'yev, and G. D. Glod *In its Probl. of Space Biol.*, Vol. 8 Jul. 1969 p 211-217 refs (See N69-32131 18-04)  
 Avail: CFSTI CSCL 06S

The influence of a hypercapnic gaseous environment (3% to 10% CO<sub>2</sub>) on the functional condition of the central nervous

system was studied. The index of the reaction of the central nervous system to hypercapnia was the sensitivity of the animals to narcotics (ether, intranarcon). The dependence of the phase changes in the functional interrelationships of the cortex in the subcutaneous formation of the central nervous system on the degree of hypercapnia and the duration of adaptation was established. Author

**N69-32156\*\*** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

**THE EFFECT OF HYPOXIA ON THE REACTION TO SEVERAL PHARMACOLOGICAL COMPOUNDS**

V. Ye. Belay, P. V. Vasil'yev, G. D. Glod, and M. I. Bryuzgina *In its Probl. of Space Biol.*, Vol. 8 Jul. 1969 p 221-226 refs (See N69-32131 18-04)  
 Avail: CFSTI CSCL 06S

In experiments on white mice, the influence of breathing a hypoxic gas mixture (7.5-9.0% O<sub>2</sub>) for a period of 1-4 hours on the reaction to ether, intranarcon, and corasole was studied. It was established that the effect of hypoxia is associated with phase changes in the sensitivity of the animals to pharmacological compounds; the narcotic effect of ether and intranarcon is increased; and the sensitivity to toxic doses of corasole is decreased. A change in the reaction to the compounds under the influence of hypoxia indicates functional changes in the central nervous system with preferential development of the process of inhibition. Author

**N69-32157\*\*** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

**THE EFFECT OF ANTIOXIDANTS ON RESISTANCE OF THE ORGANISM AND CERTAIN FUNCTIONS UNDER HYPOXIA**

Ye. Ya. Kaplan and V. V. Ogleznev *In its Probl. of Space Biol.*, Vol. 8 Jul. 1969 p 227-234 refs (See N69-32131 18-04)  
 Avail: CFSTI CSCL 06S

The influence of antioxidants (ionole, propylgallate, BE-57, ambunole, mexamine) on the individual functions of the organism of animals (white mice, rats) and their tolerance to hypoxia were studied. Antioxidants increase the tolerance in rats and mice to acute, subacute, and chronic hypoxia. An especially firm increase in tolerance to hypoxia was noted after repeated injection of mexamine. Smaller changes in the latent time of the motive reflex and more distinct changes in the stimulating process in the brain of the animals were observed. After injection of the mexamine the oxygen requirement of the animals was lowered. Author

**N69-32158\*\*** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

**THE EFFECT OF ATHLETIC TRAINING AND ACCLIMATIZATION UNDER MIDDLE ALTITUDE CONDITIONS IN THE CAUCASUS ON SEVERAL CHARACTERISTICS OF THE PERIPHERAL BLOOD OF YOUNG FIELD AND TRACK ATHLETES**

Ye. B. Gippenreyter *In its Probl. of Space Biol.*, Vol. 8 Jul. 1969 p 236-244 refs (See N69-32131 18-04)  
 Avail: CFSTI CSCL 06S

In youths and girls who have participated in field and track athletics, moving to mountainous areas produces changes in the blood: growth in the number of erythrocytes, reticulocytes, and the amount of hemoglobin. In the athletes, a decrease in the number of eosinophils in the blood which indicates activation of the function of the pituitary-adrenal system was found. In studying the process of acclimatization and conditioning of athletes, it follows that the reaction of the blood to hypoxia should be taken into account. Author

**N69-32175#** Defense Documentation Center, Alexandria, Va. MONITORING SELECTED MEDICAL PROBLEMS OF SPACE FLIGHT, VOLUME 1

Mar. 1969 220 p refs  
 (AD-685500; DDC-TAS-68-96) Avail: CFSTI CSCL 6/19

In space flight, during the takeoff, landing, and in-flight adjustments, the astronaut is exposed to changing gravitational experiences that influence his cardiovascular, respiratory, and sensory mechanisms, muscular responses, etc. The physiological responses in space are monitored by telemeter systems that detect and transmit the data to ground stations. The bibliography presents 161 annotated references dealing with these aspects of space medicine, with emphasis on biotelemetry, weightlessness, visual effects, hearing effects, and animal experimentation. Author (TAB)

**N69-32225** Michigan Univ., Ann Arbor.  
**MAN-COMPUTER SYNERGISM FOR DECISION MAKING IN THE SYSTEM DESIGN PROCESS**  
John James Allan, III (Ph.D. Thesis) 1968 208 p  
Avail: Univ. Microfilms: HC \$9.45/Microfilm \$3.00 Order No. 69-2277

While continuing technological advances incessantly make required systems more complex, they simultaneously provide new tools for the information processing task of system design. A study was made of the engineering design process and the application of these principles to defining the structural organization of a computer-based interface to aid the engineering system designer. In order to design and build the operational prototype interface discussed, the connotation of operate and the structure being operated on are defined. Viewing the designer as an entity within an environment reveals a working interface that is used to identify the categories and classes of design information. The interface, implemented in a small computer with interactive graphic capabilities operating as a satellite of a large central computer, has been built and used. The initial results are discussed and open problems for future work are listed. The appendices include a User's Guide, examples, and details of implementation. Dissert. Abstr.

**N69-32293#** Ohio State Univ., Columbus. Disaster Research Center.  
**SIMULATION STUDIES OF COMMUNICATION BEHAVIOR UNDER STRESS, PHASES ONE AND TWO Final Technical Report, 1 Feb. 1968-28 Feb. 1969**  
E. L. Quarantelli and Robert H. Roth, Jr. 31 Mar. 1969 13 p  
(Grant AF-AFOSR-572-67)  
(AD-685746; AFOSR-69-0577TR; DRC-TR-2(L)) Avail: CFSTI CSCL 5/10

A study of cross-cultural interaction has progressed through a pilot laboratory observational stage and a systematic laboratory observational stage. Among the specific activities undertaken were a literature review, a series of semi-structured interviews with individuals who had cross-cultural experiences, a set of 28 laboratory observational sessions utilizing 50 subjects of 16 different nationalities, a system for data retrieval to allow easy and rapid access to the various items of information elicited from the preceding activities, and further specification of the theoretical and methodological implications of the work. The basic design of the laboratory sessions involved the creation of culturally homogeneous groups followed by culturally heterogeneous groups involved in the same task. From data gathered in these two types of sessions the differences between culturally homogeneous and heterogeneous interaction could be assessed. Author (TAB)

**N69-32310#** Defense Documentation Center, Alexandria, Va.  
**LIFE SUPPORT IN SPACE TRAVEL, VOLUME 1 Report Bibliography, 1953-1968**  
Mar. 1969 208 p  
(AD-685600; DDC-TAS-68-91-Vol-1) Avail: CFSTI CSCL 6/11

Life Support has been described as the protection and sustenance for living organisms in extreme environments such as outer space. In space medicine, a closed ecological system is one that provides for the body's metabolism in a spacecraft, sometimes by means of recycling processes. Since, under conditions of weightlessness, physical fitness is an important factor in effective

survival in space, it is a prime requisite in selection of astronauts for space travel. This bibliography presents 149 unclassified and unlimited references that have been cataloged in the DDC collection. Volume II of this bibliography contains all references that appear in Volume I, and is designated by AD-851 150. Author (TAB)

**N69-32312#** Library of Congress, Washington, D.C. Aerospace Technology Div.  
**MICROBIAL DEGRADATION OF MATERIALS Surveys of Foreign Scientific and Technical Literature**  
Lee Perkins 7 May 1969 32 p refs *Its Work Assignment No. A-69-11*  
(ATD-69-41) Avail: Issuing Activity

A compilation of abstracts, obtained from recent Soviet scientific and technical publications is presented to provide information on Soviet research in biodegradation. The literature search was for articles on the preventive measures taken against microbial degradation of equipment and materials, especially wood, paper, cork, leather, glass, textiles, plant fibers, food, oils (vegetable or animal), adhesives, electronic equipment, or any synthetic substitutes of the above. Author

**N69-32323#** Istituto Superiore di Sanita, Rome (Italy). Laboratori di Fisica.  
**TECHNICAL CHARACTERISTICS OF AN EXPERIMENTAL FERMENTING APPARATUS WITH AUTOMATIC DRAWING [CARATTERISTICHE TECNICHE DI UN FERMENTATORE SPERIMENTALE A PRELIEVO AUTOMATICO]**  
G. Donelli 20 Dec. 1968 17 p In ITALIAN; ENGLISH summary  
(ISS-68/46) Avail: CFSTI

Technical details are reported relative to the realization of an experimental fermenting apparatus which allows the sterile automatic drawing of culture samples at regular programmed intervals. Moreover, this apparatus allows work under optimal conditions of culture aeration. Author

**N69-32364#** Defence Research Establishment, Toronto, Downsview (Ontario).  
**THE PARADOXICAL EFFECTS OF HYPEROXIA AND HYPOXIA ON THE AUDITORY EVOKED RESPONSE IN HUMANS**  
Kenneth N. Ackles, Peter B. Bennett, and Allan J. Brock [1966] 4 p refs  
(DRET-736) Avail: CFSTI

In divers breathing in air at depths of 300 ft of sea water, the depression of the auditory evoked response (AER) in humans was shown to correlate with the degree of narcosis present. During experiments the observed AER reduction seen while breathing air at high pressures was caused by oxygen and nitrogen. It was demonstrated that the AER reduction due to oxygen was not synergistic with that caused by nitrogen when breathing air at high pressures. This effect of pure oxygen on the AER in humans was demonstrated at pressures of 1, 2 and 3 atmospheres absolute (ATA). It was suggested that one of the underlying mechanisms of acute oxygen toxicity is an inhibition of intracellular metabolism and consequent histotoxic anoxia. Author

**N69-32366#** Defence Research Medical Labs., Toronto (Ontario).  
**ELECTROLYTE CHANGES IN HUMANS UNDER HYPERBARIC CONDITIONS**  
M. W. Radomski and P. B. Bennett [1967] 4 p  
(DRET-735) Avail: CFSTI

Recent findings suggest that inert gases produce a transient reversible increase in membrane permeability to cations. In support of this theory, it was shown that argon and nitrogen at narcotic partial pressures produce an electrolyte imbalance in the cerebro-spinal fluid of cats, whereas the non-narcotic helium causes little change in electrolyte concentrations. Evidence of such a redistribution of electrolytes in the extracellular body fluids of man

has not been demonstrated as yet. This possibility was examined by measurement of electrolyte concentrations in the urine and blood of humans exposed to elevated pressures of narcotic and non-narcotic inert gases. Author

**N69-32385#** Federation of American Societies for Experimental Biology, Bethesda, Md.

**CONTROL OF VELOCITY IN MANUAL TRACKING MOVEMENTS OF MAN**

M. S. Zalkind 1968 30 p refs Transl. into ENGLISH from Zh. Vysshei Nervnoi Deyatel'nosti (Moscow), v. 18, no. 1, 1968 p 19-29

(PB-182406T; NS-97) Avail: CFSTI CSDL 06P

The study of velocity changes during a skilled movement requiring strict control is of interest. A very simple task was selected, namely to maintain a constant speed throughout the performance of a simple movement. The performance of this task was assessed on the basis of both the speed assigned and the possibility of visual control over movement. Tracking a photic stimulus moving at constant velocity was chosen for the experiments, because the experimenter could thereby select the speed of movement given by a subject. Author (USGRDR)

**N69-32399#** Autonetics, Anaheim, Calif.

**DATA REDUCTION USING INFORMATION THEORETIC TECHNIQUES Final Report, 22 Nov. 1967-22 Nov. 1968**

Jerry A. Lebo Griffiss AFB, N.Y. RADC Mar. 1969 105 p refs

(Contract F30602-68-C-0088)

(AD-685810; C8-3008/501; RADC-TR-68-610) Avail: CFSTI CSDL 6/4

This report describes results of a study to develop methods of data reduction leading to pattern recognizer design. These techniques are graphic display and data transformation algorithms primarily intended for implementation in an on-line pattern analysis system. The report includes computer program flow charts and instruction listings for the graphic display programs as implemented on an off-line CRT system. Author (TAB)

**N69-32409#** Michigan State Univ., East Lansing. Div. of Engineering Research.

**THE RETICULAR FORMATION. PART 1: MODELING STUDIES OF THE RETICULAR FORMATION Interim Scientific Report**

W. L. Kilmer, J. Blum, and W. S. McCulloch Feb. 1969 41 p refs

(Grant AF-AFOSR-1023-67)

(AD-685732; AFOSR-69-0962TR; ISR-3) Avail: CFSTI CSDL 6/4

Three models of the reticular formation (RF) are described that originate in the hypothesis that the RF is the structure in vertebrates that commits an animal to one mode of behavior or another. Examples of modes are sleep, eat, drink, fight, flee, and mate. About 25 such modes occur and, if properly interpreted, are mutually exclusive. The RF is of interest for command system design since its million and more neurons are able to reach a workable consensus as to the proper mode of total organism commitment in a fraction of a second. The RF neurology is reviewed on the assumption that it provides the main clues. In particular, an exposition of the RF Golgi anatomy that reveals RF circuit patterns is used in the production of a computer simulation model called S-RETIC. The design and performance of S-RETIC are discussed. The model consists of a dozen probabilistic hybrid computer modules linked together with jumpers of different lengths to form an anastomotic array. Author (TAB)

**N69-32410#** Michigan State Univ., East Lansing. Div. of Engineering Research

**THE RETICULAR FORMATION. PART 2: THE BIOLOGY OF THE RETICULAR FORMATION Interim Scientific Report**

W. L. Kilmer Feb. 1969 78 p refs

(Grant AF-AFOSR-1023-67)

(AD-685733; AFOSR-69-0961TR; ISR-3) Avail: CFSTI CSDL 6/3

The paper describes and discusses a mode hypothesis for the performance of the reticular formation (RF) that postulates that the core of the RF is the structure that commits a vertebrate to one mode of behavior or another. If properly interpreted, the modes are mutually incompatible. In integrated, stable physiological pattern occurs for each mode. The paper discusses the definition of a mode, some relations between modes, and several elements involved in switching between modes. Author (TAB)

**N69-32471#** Joint Publications Research Service, Washington, D.C.

**EFFECT OF SOME SPACEFLIGHT FACTORS ON THE CENTRAL NERVOUS SYSTEM**

N. N. Livshits et al 17 Jul. 1969 25 p refs Transl. into ENGLISH from Usp. Sovrem. E i. (Moscow), Mar.-Apr. 1969 p 256-272

(JPRS-48439) Avail: CFSTI

This article reports the results of studies on the influence of ionizing radiation on CNS functions with due regard for the peculiarities of radiation effects under spaceflight conditions; time factor, differences in linear ionization density, and combinations of radiation and dynamic factors. The laws and mechanisms of vibration effects were considered. Irradiation studies on rabbits, rats and guinea pigs were conducted. Coefficients of relative biological effectiveness on higher nervous activity in small animals were also determined. Author

**N69-32504\*#** Massachusetts Inst. of Tech., Cambridge. Man-Vehicle Lab.

**LIFE SUPPORT IN UNUSUAL ENVIRONMENTS**

L. R. Young Feb. 1969 37 p refs

(Grant NGR-22-009-312)

(NASA-CR-103630; MVLS-69-2) Avail: CFSTI CSDL 06K

The biotechnological requirements for developing life support systems are investigated. Summaries of the current status in atmospheric trace contaminant monitoring, extravehicular activities, water reclamation, and regenerative atmospheric control systems are presented. F.O.S.

**N69-32509\*#** Harvard Univ., Boston, Mass. Thorndike Memorial Lab.

**A STUDY OF PHYSIOLOGICAL MECHANISMS AND INTERRELATIONS BETWEEN SYSTEMIC AND REGIONAL BLOOD VOLUME BLOOD FLOW AND ELECTROLYTE BALANCE Interim Progress Report**

Walter H. Abelmann 30 Jun. 1969 5 p refs

(Grant NGR-22-007-019)

(NASA-CR-103596) Avail: CFSTI CSDL 06C

Results are summarized for three study tasks: (1) regulation of sodium excretion, including effects of fasting and refeeding, and atrial arrhythmias effects on cardiac and renal function; (2) fiber optic catheter systems development for measurement of intravascular pressure, including measurements of normal ventricular pressures in the mouse, and a hemodynamic study of biventricular failure in experimental chagasic myocarditis; and (3) chronotropic augmentation of cardiac function in experimental myocardial infarction. E.C.

**N69-32541\*#** Hamilton Standard, Farmington, Conn. Biomedical Systems Dept.

**ANALYSIS OF PATTERNS OF N-ALKANE DISTRIBUTIONS Final Report**

Dian R. Hitchcock 15 Jul. 1969 81 p refs

(Contract-NASw-871)

(NASA-CR-103670; HSER-5006) Avail: CFSTI CSDL 06C

The concepts applicable to the problem for distinguishing materials of biotic origin from materials of nonbiotic origin are studied. The assumptions of the fundamental distinctions are that the biotic material accumulates a negative entrophy whose occurrence is unlikely in a nonbiotic environment, and living systems establish and maintain a chemical energy gradient. The order of n-alkane distribution presented are: (1) classifying hydrocarbons of biological origin in terms of known or presumed degree of degradation by nonbiological and biological agents in the terrestrial environment; (2) distinguishing between terrestrial hydrocarbons of recent biological origin and similar hydrocarbons synthesized in a laboratory; and (3) testing the hypothesis that biological order varies as a function of phylogenetic age. F.O.S.

**N69-32570#** Naval Submarine Medical Center, Groton, Conn. Submarine Medical Research Lab.

**PERFORMANCE EFFECTS OF INCREASED AMBIENT PRESSURE. 1: HELIUM-OXYGEN SATURATION AND EXCURSION DIVE TO A SIMULATED DEPTH OF 900 FEET Interim Report**

Benjamin B. Weybrew and James W. Parker Nov. 1968 28 p refs

(AD-686024; SMRL-556; NAVMED-MF12.524-004-9009-2) Avail CFSTI CSCL 6/19

Two experienced commercial divers were administered an addition, a letter-cancellation and a form perception test before, at selected intervals, during, and after a simulated helium-oxygen dive to a saturation depth of 600 feet with excursions to 800 and 900 feet (total dive time 143 hours). Apart from vague joint and muscle sensations reported by means of a subjective checklist, the slow descent to 600 feet was uneventful. Slightly poorer performance in addition letter-cancellation and form perception was seen at 800 feet as were symptoms resembling the so-called helium tremors. No remarkable changes in the test profiles were observed during the implementation of a conservative (15 minute/foot) decompression schedule, though obscure knee pains in one diver persisted to the surface but with no untoward sequelae. Suggestions for improving experimentation aimed at an assessment of the performance effects of hyperbaric conditions are provided. Author (TAB)

**N69-32571#** Naval Medical Research Inst., Bethesda, Md. **THE USE OF ANALOG COMPUTERS FOR THE ANALYSIS OF DECOMPRESSION SCHEDULES Interim Report**

Richard G. Buckles and David L. Greenberg Mar. 1968 36 p refs

(AD-686033; NAVMED-MR005.04-0095-2) Avail: CFSTI CSCL 6/19

The report presents the utility of using an analog computer to compute decompression schedules based on the model currently used in the U. S. Navy. Continuous ascent profiles are computed following any dive profile of up to four dive-and-hold maneuvers of less than 1000 feet. Author (TAB)

**N69-32574\*#** Techtran Corp., Glen Burnie, Md. **HOW THE SOYUZ 4 AND SOYUZ 5 CREWS TRAINED [DLYA RABOTY V OTKRYTIY KOSMOSE]**

I. Kolosov et al Washington NASA Jul. 1969 9 p Transl. into ENGLISH from *Aviats. i Kosmonaut.* (Moscow), No. 3, 1969 p 6-7

(Contract NASw-1695)

(NASA-TT-F-12432) Avail: CFSTI CSCL 051

A popular description is presented of the problems involved in extravehicular activity (EVA) and training for EVA. The cosmonauts train in model spacecraft contained in aircraft flying trajectories producing weightlessness. Repeated ballistic parabola flights are said to improve the ability of the cosmonauts to work in the weightlessness environment. Author

**N69-32586#** Commissariat a l'Energie Atomique, Grenoble (France). Centre d'Etudes Nucleaires.

**RADIOPROTECTIVE PROPERTIES OF SOME HETEROCYCLIC NITROGENOUS COMPOUNDS AGAINST SPECTRAL MODIFICATIONS IN HEMOGLOBIN OF X-IRRADIATED MICE [PROPRIETES RADIOPROTECTRICES DE CERTAINS COMPOSES HETEROCYCLIQUES AZOTES SUR LES MODIFICATIONS SPECTRALES DE L'HEMOGLOBINE DE SOURIS IRRADIEE]**

Hamid Roushdy, Theodore Pierotti, and Michel Polverelli

Jan. 1969 24 p refs In FRENCH; ENGLISH summary

(CEA-R-3688) Avail: CFSTI

This report concerns the radioprotective action of imidazole and benzimidazole on visible and near ultraviolet hemoglobin absorption spectra obtained from mice after 'in vivo' lethal dose X-irradiation. The results, compared to those obtained with cysteamine show: (a) possible pharmacological action of the heterocyclic nitrogenous compounds on the ga and gb bands (540 and 580 mμ) and (b) a significant variation of the ratio of the optical densities (580/540) after irradiation with hemoglobin of non and radioprotected mice. However, following a real drop of absorption maxima, normal optical densities of each band are found again the twenty-fifth day after irradiation. A physico-chemical study would be necessary to understand the hemoglobin transformation after irradiation and perhaps, its possible radioprotection. Author (ESRO)

**N69-32594#** Israel Program for Scientific Translations, Ltd., Jerusalem.

**SEX IN PLANTS, PART 2**

L. I. Dzharparidze 1969 219 p refs Transl. into ENGLISH of the book "Pol u Rastenii" Tbilisi, Izd. Metsniereba, 1965

(TT-68-50453-Pt-2) Avail: CFSTI

This monograph deals with internal distinctions between sexes in dioecious plants. Experimental data are given concerning sexual differences in photosynthesis, respiration, viability under adverse growth conditions, enzymatic activities, and content of various vital substances. All these data support the principle that the life form of flowering plants generally known as the sporophytes is by no means asexual, but possesses a definite sex with inherent sexual characteristics. The problem of controlling formation and development of sex is discussed in a general manner. An extensive bibliography is included. Author

**N69-32604** National Lending Library for Science and Technology, Boston Spa (England).

**BONE MARROW AND RADIATION**

Anatoli Kisselyov [1968] 5 p Transl. into ENGLISH from Russian Rept. Presented at the Intern. Atomic Energy Agency Conf., Moscow, 22-26 Jul. 1968

(NLL-M-7425-(5828.4F)) Avail: Natl. Lending Library, Boston Spa, Engl.

The transplant of bone marrow for blood production in patients with diseased marrow is discussed. The transplanted marrow functions until the patients own marrow recovers, gradually destroying the transplant, and regains the function of producing blood. Because the donor marrow must be fresh, and type and many other factors must match, this method is not considered suitable for wide use. The feasibility of preserving bone marrow by cryobiology is studied. The establishment of a bank with stored frozen units, and the shipping procedures are described. The possibility of cultivating bone marrow under laboratory conditions is considered. F.O.S.

**N69-32614#** Texas Research Inst. of Mental Sciences, Houston. Psychophysiology Div.

**PSYCHOPHYSIOLOGICAL CORRELATES OF HUMAN INFORMATION PROCESSING UNDER ALTERED STATES OF CONSCIOUSNESS Final Report**

Neil R. Burch and Robert Roessler Apr. 1969 10 p refs  
(Grant AF-AFOSR-951-67)

(AD-686089; AFOSR-68-2366) Avail: CFSTI CSCL 5/10

The document concerns the study of human psychophysiological response with one type of instrumentation of the 2-channel electroencephalogram (EEG), galvanic skin response (GSR) - a modification with 8-second time constant, finger plethysmogram compared with standard measures of GSR, respiration and arm cuff plethysmogram. The stimulus field employed has been that of a standard set of relevant-irrelevant questions in an interrogation paradigm. Additional correlates of the stimulus-psychophysiological response patterns have been various psychological parameters such as ego strength, anxiety, etc. Sedative medication (Seconal) and a class of stimulants (Dextro-amphetamine) have been investigated for their effects on correct identification of subject role or validity of the interrogation procedure utilizing the listed psychophysiological measures. Programs have been written for the general purpose digital computer which automate the final logical decisions necessary for role identification or determination of stress responses to specific questions.

Author (TAB)

**N69-32654#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

#### **HANDBOOK ON RADIATION SAFETY**

V. F. Kozlov Oct. 1968 271 p refs Transl. into ENGLISH of the Book "Spravochnik Po Radiatsionnoi Bezopasnost" Moscow, Atomizdat., 1967 p 1-277

(AD-685997; FTD-MT-24-243-68) Avail: CFSTI CSCL 18/4

The handbook discusses problems of radiation safety in institutions and plants handling radioactive substances and sources of ionizing radiation, and gives a systematic presentation of the principles and responsibilities for organizing dosimetric controls and other protective measures. Tabulated data on radiation doses and their biologic effects, and on dosimetric calibration equipment are presented, and dosimetric methods are explained. Rules and principles for the safe transportation of radioactive materials and the removal of radioactive waste are given. The handbook is intended for scientific workers, engineers, and members of the dosimetric control service in institutions and plants dealing with radioactive substances and sources of ionizing radiation. The presented data were compiled from Soviet and foreign literature published up to 1966.

Author (TAB)

**N69-32659#** Armed Forces Radiobiology Research Inst., Bethesda, Md.

#### **COMPARISON OF RADIATION SENSITIVITY, ENDOGENOUS COLONY FORMATION AND ERYTHROPOIETIN RESPONSE FOLLOWING PROLONGED HYPOXIA EXPOSURE**

J. P. Okunewick, K. M. Hartley, and J. H. Darden Nov. 1968 35 p refs

(AD-686057; AFRRI-SR68-22) Avail: CFSTI CSCL 6/18

Experiments have been carried out to evaluate the effect of continual hypoxia exposure on the hematopoietic system of mice. Three parameters have been investigated: (A) mortality sensitivity to x irradiation at dose levels between 675 and 775R, (B) formation of endogenous erythroid colonies in the spleen after x irradiation, and (C) response to erythropoietin injection. The results indicate that sensitivity to x irradiation is lessened, colony formation is greater, and erythropoietin response is enhanced if irradiation is performed 3 days after cessation of hypoxia on mice previously exposed for 3 to 4 weeks to one-half atmosphere of air. The findings suggest that prolonged stimulation of the erythroid system results in an enlargement of those hematopoietic compartments associated with cellular reproduction and with response to erythropoietic stimulation.

Author (TAB)

**N69-32727#** Air Force Cambridge Research Labs., Bedford, Mass.

#### **NONLINEAR CROSS-SPECTRAL ANALYSIS AND PATTERN RECOGNITION**

Edmond M. Dewan Jan. 1969 46 p refs *Its Phys. and Math. Sci. Res. Papers* No. 367

(AD-687085; AFCRL-69-0026) Avail: CFSTI CSCL 6/4

Generalized harmonic analysis has been applied in many fields, and has become the basis of statistical communication theory. This paper introduces another generalization of this technique, with the specific intention of testing the nature of nonlinear interaction in time series data. The nonlinear cross-spectrum developed is illustrated with examples from meteorology and neuroelectric signals.

Author (TAB)

**N69-32751#** Army Foreign Science and Technology Center, Washington, D.C.

#### **A METHOD OF QUANTITATIVE DETERMINATION OF MICROORGANISMS IN SUBSTANCES**

I. N. Nozarov Mar. 1969 5 p Transl. into ENGLISH of Izobret., Prom. Obraztsy, Tovarnye Znaki (Moscow), v. 44, no. 16, 1967 85 p

(AD-686142; FSTC-HT-23-963-68) Avail: CFSTI CSCL 6/13

This Author Certificate presents a method for quantitative determination of microorganisms in substances such as milk products. A specimen of the tested substance is acted upon by hydrogen peroxide. The amount of microorganisms is determined from the volume of gas separated in the course of plasmolysis. Each 200-ml specimen of the tested substance is treated with about 20 ml of 3% aqueous solution of hydrogen peroxide.

Author (TAB)

**N69-32768** National Lending Library for Science and Technology, Boston Spa (England).

#### **DIFFICULTIES CAUSED BY THE WEARING OF BREATHING APPARATUS. INVESTIGATION OF THEIR OCCURRENCE; COMMUNICATION 1: EFFECT OF WEIGHT [ERSCHWERNISSE BEIM TRAGEN VON ATEMSCHUTZGERAETEN. UNTER SUCHUNGEN UEBER DEREN AUFTRETEN; 1. MITTEILUNG: EINFLUSS DER GEWICHTSBELASTUNG]**

G. Schleusing et al 29 Jan. 1969 17 p refs Transl. into ENGLISH from Intern. Z. Angew. Physiol. (Berlin), v. 24, no. 2, 1967 p 81-101 and Atemschutz Inform. (Ger.), no. 2, Jul. 1967 p 25-33

(NLL-SMRE-Trans-5658.2-(8313.4)) Avail: Natl. Lending Library, Boston Spa, Engl.

Difficulties caused by wearing breathing apparatus are examined. The additional weight loading leads to an increase in the energy transformation and hence to a reduction of efficiency and rapid tiring. The investigations pursued showed that the increase in energy expenditure which can be seen from the breathing frequency (f), breathing time volume (Vvent l), O<sub>2</sub> absorption (VO<sub>2</sub>), and CO<sub>2</sub> elimination (VCO<sub>2</sub>) depends on the following factors: (1) The higher the degree of basic loading, the more the additional weight loading makes itself felt. (2) The increase in energy expenditure and with it the change in f, Vvent l, VO<sub>2</sub>, and VCO<sub>2</sub>, is less during continuous work with the same amount of additional loading than during intermittent work. (3) The greater the weight of the apparatus carried, the greater the increase in energy expenditure.

K.R.G.

**N69-32812\*#** Aztec School of Languages, Inc., Maynard, Mass.

#### **EXPERIMENTAL INVESTIGATION ON THE EFFECT OF LATERAL GLARE ON CENTRAL VISUAL ACUITY [EXPERIMENTELLE UNTERSUCHUNGEN UEBER DEN EINFLUSS SEITLICHER BLENDUNG AUF DIE CENTRALE SEHSHAERFE]**

R. Depene Washington NASA Jul. 1969 23 p refs Transl. into ENGLISH from Klin. Monatsbl. Augenheilk. (Stuttgart), v. 38, 1900 p 289-307, 390-399

(Contract NASw-1692)

(NASA-TT-F-12439) Avail: CFSTI CSCL 06P

Reports are presented of impaired vision and of improved vision as a result of glare. An apparatus is constructed in which the effects of glare are investigated at various intensities and angles of incidence. Author

**N69-32870#** Joint Publications Research Service, Washington, D.C.

**TRANSLATIONS, ON EASTERN EUROPE. SCIENTIFIC AFFAIRS NO. 62: BIODETECTION OF SMALL RADIATION DOSES DISCUSSED**

Vosilav Plecas et al 30 Jul. 1969 12 p refs Narodno Zdravlje, Serbo-Croatian (Belgrade) no. 3, 1969 p 102-106 (JPRS-48511) Avail: CFSTI

Small radiation dosage effects on humans are reviewed with emphasis on hematological, latent, neurological, and genetic changes, and disruption to spermatogenesis. E.C.

**N69-32879#** Columbia Univ., New York. Psychophysics Lab. **TRANSFER EFFECTS IN ADAPTATION TO PRISMATIC DISPLACEMENT**

Elizabeth van Laer 1 Sep. 1968 11 p refs

(Contract DADA17-68-C-8065)

(AD-687139; PLR-5) Avail: CFSTI CSCL 5/10

Twenty Ss wore a 20 diopter displacement prism while they practiced tracking a moving target and when they performed a second task requiring location of a stationary target. Results showed significant transfer of adaptation effects to performance on the second task, and showed a limited aftereffect upon removal of the prism. Massed and distributed practice on the tracking task produced differences in tracking performance, but no differences in the amount of transfer or in the aftereffect. Ten control Ss showed no adaptation and no aftereffect. Author (TAB)

**N69-32885#** Bundesministerium fuer Wissenschaftliche Forschung, Bad Godesberg (West Germany).

**THE EFFECT OF LOW DOSES OF GAMMA-RADIATION ON PLANT GROWTH**

A. Suess and W. Grosse Munich, West Germany Bayerische Landesanstalt fuer Bodenkulture, Pflanzenbau und Pflanzenschutz Dec. 1968 42 p refs In GERMAN; ENGLISH summary (BMwF-FBK-68-48) Avail: AEC Depository Libraries

Experiments were made with several agricultural plants to study the influence of a seed irradiation with doses from 1 to 100 R on plant growth. A radiation-induced stimulation at different stages was found. The stimulation by radiation is induced by physiological reactions; therefore many changes can be observed. The stimulation effect can be influenced by the doses, the plant variety, and the growing conditions. Significant results were observed in germination, youth development, and at harvest. The uptake of nutrient elements and some enzyme-systems were influenced by irradiation. With potatoes, variety Maritta, an after-year effect was found in starch and tuber yield. Author (NSA)

**N69-32912#** Instituto Nacional de Investigaciones Agronomicas, Madrid (Spain).

**USE OF RADIOACTIVE ISOTOPES FOR THE LABELING OF CERATITIS CAPITATA**

Fernando Caballero, Luis Mellado, Manuel Arroyo, and Antonio Jimenez [1967] 22 p In SPANISH Presented at the Symp. on Appl. of Radioisotopes, Madrid Spain (CONF-670649-7) Avail: AEC Depository Libraries

Laboratory tests made on the labeling of the fruit fly *Ceratitis capitata* Wied with  $^{32}\text{P}$  were reported. The fruit flies were fed diets with 0.01 and 0.1 mc  $^{32}\text{P}$  for each 5 g of feed. The eggs were collected and transferred to another cage. The eggs were allowed to hatch, develop larvae, and finally develop into the pupa

and adult stages. The adults were cross bred. The daily breeding, the radioactivity of the eggs, and the radioactivity of the pupae and larvae from the eggs were measured. The results are tabulated and show that the addition of  $^{32}\text{P}$  to the diet produces eggs, larvae, pupae, and adults that are all apparently normal. The study of the second generation showed that low radiation doses stimulated the breeding, but higher doses reduced the breeding. All the  $^{32}\text{P}$  administered in the diet of the first generation was eliminated in the second generation. NSA

**N69-32913#** School of Aerospace Medicine, Brooks AFB, Tex. Environmental Systems Div.

**SOME CHARACTERISTICS OF OOCYSTIS POLYMORPHA, A THERMOTOLERANT GREEN ALGA SUITABLE FOR MASS CULTURE, AUGUST 1967-JUNE 1968**

B. Richardson, David M. Orcutt, Lawrence Rosner, and Richard L. Miller Jan. 1969 15 p refs

(AD-686734; SAM-TR-69-3) Avail: CFSTI CSCL 6/3

The possible use of unicellular algae in bioregenerative gas exchange systems is severely limited by their tendency to adhere to vessel walls and to foul continuous culture systems. This report describes the physiologic and biochemical characteristics of *Oocystis polymorpha*, a newly discovered algal species which has a high degree of productivity but little tendency to foul culture system surfaces. The composition of the organism and its responses to environmental variable were compared to those of *Chlorella sorokiniana*. It was concluded that for mass culture *Oocystis polymorpha* represents a significant improvement over previously studied species. Author (TAB)

**N69-32916#** School of Aerospace Medicine, Brooks AFB, Tex. Ophthalmology Branch.

**DIPOLE SHUTTER: A TRANSPARENCY FOR EYE PROTECTION, JANUARY 1966-AUGUST 1968**

John A. Carpenter and Wendell R. Peters Dec. 1968 31 p refs Supported in part by DASA

(AD-686732; SAM-TR-68-136) Avail: CFSTI CSCL 6/17

The dipole shutter was investigated as a possible eye protective device for the deleterious effects of high-intensity flashes. Both theory and engineering design have been explored to ascertain if the principle could be developed into a usable device. A transparency with minute electrodes etched on its surface has been found to provide sufficient electrostatic field strength for various alignments, and it is believed that this cell will be ophthalmically acceptable. Heretofore, herapathite solution has been utilized to provide the dynamic medium for change in optical density of transmission. Other submicron metallic whiskers have been analyzed to find if the antenna effect could be enhanced. No such enhancement was noted, and possibly some other mechanism is responsible for the varying effect. The dipole shutter may still prove to be an effective eye protective device because of its several desirable features; however, the range of dynamic change in optical density apparently will not be as great as predicted by theory. Author (TAB)

**N69-32957#** City Coll. of the City of New York. Dept. of Physics.

**TOWARD FORMULATION OF CRITERIA FOR IMAGE ENHANCEMENT Annual Report, Mar. 1968-Feb. 1969**

Leo Levi Mar. 1969 101 p refs

(Contract N00014-67-A-0365)

(AD-686482) Avail: CFSTI CSCL 5/10

The degree of enhancement is to be valued in terms of the amount of information (in the colloquial sense) transferred to the final detector. Special attention is given to those systems in which the human visual system is the final detector. An extensive literature survey of proposed image quality criteria was made. These were evaluated and their areas of applicability determined. Under the restriction of linearity, optimization, too, was formulated for the relevant criterion. A survey of enhancement techniques was

made and literature analyzing their performance was collected. A basic theory of a visual response was developed in which the various noise-sources play an integral part. This approach was carefully compared with experimental data concerning threshold contrast and accounted for these in detail. Since optical systems usually work in polychromatic light and available lens and detector performance data for such light are extremely limited, such data were computed for the 72 combinations of six of the most common light sources and twelve of the most common detectors, including photopic and scotopic vision. Author (TAB)

**N69-32998#** Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

**MATHEMATICAL MODELING OF HUMAN PERFORMANCE ERRORS FOR RELIABILITY ANALYSIS OF SYSTEMS Final Report, Nov. 1966-Nov. 1967**

William B. Askren and Thaddeus L. Regulinski (AF Inst. of Technol.) Jan. 1969 38 p refs

(AD-687084; AMRL-TR-68-93) Avail: CFSTI CSCL 5/8

The research investigates the feasibility of modeling human performance errors in application to the reliability analyses of man-machine systems. The research addresses itself to time-continuous tasks with the derivation of a general mathematical model of the probability of errorless performance which is equated to human performance reliability. The application of this model and the implications of the time to first error concept were tested with a laboratory experiment using a vigilance task. The observed times to first miss error, times to first false alarm error, and times to first combined miss and false alarm errors were ordered and, through classical interference theory, the underlying density functions were isolated. A number of distributions were tested for goodness of fit with the data. The Weibull, gamma, and log-normal distributions emerged as relevant paradigms. The normal and exponential distributions were rejected. It was concluded that the derived general mathematical model of human performance reliability and the expected value of the random variable, time-to-first-human-error, are meaningful ways to quantify human performance of time-continuous tasks. Author (TAB)

**N69-33009#** Dayton Univ. Research Inst., Ohio.

**A MATHEMATICAL MODEL FOR THE DYNAMIC COUNTERROLLING OF THE HUMAN EYE Final Report, Dec. 1965-Jul. 1967**

John W. Mc Closkey, Henry T. Mohlman, and Robert S. Kellogg Nov. 1968 61 p

(Contracts AF 33(615)-1196; F33615-68-C-1041)

(AD-687160; UDRI-TR-68-02; AMRL-TR-68-106) Avail: CFSTI CSCL 6/16

When the head is tilted to the side, the eyes rotate slightly in the opposite, compensatory, direction. This ocular counterrolling has been related to, and may provide a useful index of, otolith function. This report describes a technique for inducing and precisely recording ocular counterrolling. In normal subjects the eyes rotate as much as plus or minus 6 degrees depending on the amount, direction, and speed of head rotation around its X (fore and aft) axis. Counterrolling is maximum under static or low rotation-rate conditions. Labyrinthine-defective subjects exhibit little or no compensatory counterrolling. Author (TAB)

**N69-33010\*#** Wisconsin Univ., Madison. Food Research Inst. **STABILITY OF VIRUSES IN FOODS FOR SPACE FLIGHTS Semiannual Status Report, 1 Dec. 1968-31 May 1969**

Dean O. Cliver 31 May 1969 6 p

(Grant NGR-50-002-086)

(NASA-CR-101838) Avail: CFSTI CSCL 06E

Results of exploratory studies on the stability differences between enteric virus (poliovirus) and respiratory virus (influenza A virus) are reported. A wide variety of bite-size food samples intended for rehydration in the pack was tested, including apricot

cubes, gingerbread, cream-style corn, banana pudding, beef bites, and bacon squares. The materials, viruses, culture techniques, and results are discussed in detail. It was found that the influenza A virus is not likely to be transmitted in foods for space flight. Poliovirus was found to persist for weeks at room temperature, for months in some foods at 5°C, and it appears not to be inactivated at all in bacon squares at 5°C. K.W.

**N69-33015#** Pennsylvania Hospital, Philadelphia. Dept. of Psychiatry.

**STUDIES OF PSYCHOPHYSIOLOGICAL BASELINES Final Report**

George E. Ruff Mar. 1969 13 p refs

(Contract F44620-67-C-0024)

(AD-685802; AFOSR-69-0409TR) Avail: CFSTI CSCL 5/10

In order to explore the use of psychophysiological baselines as indices of alertness or stress, changes in autonomic variables under different conditions of activity were investigated. Three experiments were carried out in which subjects were studied during rest, monitoring, and mental arithmetic. Continuous recordings were made of respiratory rate, heart rate, finger volume, pulse volume, skin temperature, and skin resistance. Means, standard deviations, ranges, and mean square successive differences were calculated for each period of the experiment. Significant differences in the baseline of these variables were found between work and rest periods. Changes were in the direction of increased autonomic activation during work. Author (TAB)

**N69-33041#** California Univ., Los Angeles. Dept. of Engineering. **ADAPTATION OF DIVERS TO DISTORTION OF SIZE AND DISTANCE UNDERWATER**

Helen E. Ross, Samuel S. Franklin, and Gershon Weltmann Jan. 1969 40 p refs

(Contract N00014-67-A-0111)

(AD-684871; Rept-68-61; TR-45) Avail: CFSTI CSCL 5/10

This report describes a series of five experiments conducted during summer 1968 to examine adaptation of divers to size and distance distortion underwater. Visually perceived distortions of size and distance are produced by the diver's facemask which introduces an air-water interface between the eye and the object of regard. The effect of this interface is to decrease image distance by about one-fourth. Under these conditions objects are likely to be reported as closer or larger, or closer and larger than they actually are. Adaptation to distortions of size and distance were investigated by two techniques: (1) the method of adjustment where a diver adjusted the size of a horizontal line, set in the frontal plane at a fixed distance, to a length of 12 inches, (2) the method of estimation where the diver recorded his judgments of the size and distance of a series of targets which varied on these dimensions. Of the five experiments conducted in the underwater research facility tank and swimming pool at UCLA and in the ocean, three were successful in demonstrating adaptation. Author (TAB)

**N69-33042#** Flying Personnel Research Committee, London (England).

**THE AIR FORCE'S MIDDLE EAST TRIAL OF THE Mk 6 ANTI-g SUIT, AUGUST-DECEMBER 1966**

A. N. Nicholson and E. M. B. Smith Jan. 1968 14 p refs

(FPRC/Memo-239) Avail: CFSTI

The Mark 6 anti-g suit is a lightweight (0.8Kg) washable garment based on conventional physiological principles and employing neoprene impregnated nylon bladders, terylene fabric and an improved fabric loop and lacing adjustment. For trials purposes two versions were used: the Mark 6A with an American pattern zip fastener, and the Mark 6B with a British zip. Twelve Royal Air Force pilots employed in the Strike role in the Middle East were sized and fitted with a Mark 6A and a Mark 6B anti-g suit. The suits were worn operationally for a twelve week period and assessments obtained by means of a questionnaire at the six and

twelve week points. The Mark 6 anti-g suit was found to be a significant improvement in all respects over the Mark 5 suit. Minor modifications were required to the design of the knee portion and the zip fasteners to correct faults found during the trial. Author

**N69-33053#** Israel Program for Scientific Translations, Ltd., Jerusalem.

**PHYSIOLOGY OF DEEP DORMANCY IN SEEDS**

M. G. Nikolaeva and I. N. Kononov, ed. 1969 228 p refs Transl. into ENGLISH of the Book "Fiziologiya Glubokogo Pokoya Semyan" Leningrad, Izd. Nauka, 1967 Copyright. Avail: CFSTI

The importance of proper presowing preparation of seeds characterized by deep dormancy is discussed and data presented from long term experimental studies of the physiological processes taking place at the time of presowing. Particular attention was paid in the studies to the seeds of woody plants, which as a rule show deep dormancy and great difficulties in germination, due to the economic urgency of forest restoration, creation of forest belts, and planting of gardens and trees in Russian towns and villages. The types of dormancy are classified, and information is given on seed germination conditions of various representative species. Detailed data are included which show the changes taking place in dormant seeds during stratification and inducement of secondary dormancy.

A.C.R.

**N69-33094#** Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

**MATHEMATICAL DERIVATION OF THE INTERSPIKE INTERVAL HISTOGRAM FROM THE SPIKE OCCURRENCE HISTOGRAM OF NEURONAL SPIKE DATA Final Report, Mar. 1967-Mar. 1968**

Marvin C. Ziskin Dec. 1968 38 p refs (AD-687083; AMRL-TR-68-38) Avail: CFSTI CSCL 6/16

In the analysis of neuronal spike data, the spike occurrence histogram and the interspike interval histogram are frequently computed. Both of these computations are derived independently from the raw data. In a previous report, it was shown that under certain conditions, the interspike interval histogram can be derived directly from the spike occurrence histogram. The report provides the complete mathematical details of this derivation. The predictive ability of the derived equation is demonstrated using computer-simulated data and with actual neurophysiological data. In all of these cases, the agreement between the predicted and empirical results satisfied chi-square goodness-of-fit criteria at the 95% confidence level.

Author (TAB)

**N69-33102#** Nuklearni Institut Iozef Stefan, Ljubljana (Yugoslavia). **ACTIVATION ANALYSIS OF MERCURY IN BIOLOGICAL SAMPLES AT NANOGRAM LEVEL BY A VOLATILIZATION METHOD**

L. Kosta and A. R. Byrne Dec. 1968 13 p refs Submitted for publication (R-554) Avail: CFSTI

The method involves trapping volatile interfering activities, such as bromine or chlorine, and selectively adsorbing mercury on a strip of filter paper which has been previously impregnated with elemental selenium. This strip is later counted for quantitative evaluation. Nanogram amounts of mercury are easily detected following irradiation times of the order of 24 hours at a flux of  $10^{12} \text{ n/cm}^2 \text{ sec}$ . Extremely high decontamination factors make it possible to use less expensive counting equipment such as a scintillation detector combined with a scaler. Most of the activity, due mainly to sodium or potassium remains as nonvolatile residue behind the shielding. The analysis can therefore be started immediately after irradiation. The versatility of the method was demonstrated by the analysis of a wide range of samples such as water, cellulose, flour, fish solubles or animal blood samples with mercury contents between 1 and 200 nanograms/gram of sample.

Author

**N69-33103#** Joint Publications Research Service, Washington, D.C.

**CYBERNETICS AND THE CREATIVE PROCESS**

15 Jul. 1969 12 p Transl. into ENGLISH from Lit. Rossiya (USSR), 23 May 1969 p 16-17 (JPRS-48419) Avail: CFSTI

A popularized account is presented projecting the usage of computers to aid in the creative process. Specific areas considered include: engineering design, linguistic art, and musicology. Emphasis is placed upon interactive, on-line systems with light-pen input devices and CRT displays.

K.R.G.

**N69-33129#** Federal Aviation Administration, Oklahoma City, Okla. Civil Aeromedical Inst.

**ADAPTION TO VESTIBULAR DISORIENTATION. PART 10: MODIFICATION OF VESTIBULAR NYSTAGMUS AND VERTIGO BY MEANS OF VISUAL STIMULATION**

William E. Collins Oct. 1968 19 p refs (FAA-AM-68-28-Pt-10) Avail: CFSTI

A conflict among sensory signals frequently underlies problems of disorientation, vertigo, and motion sickness. In this study, visual information in conflict with vestibular signals was presented to groups of subjects by illuminating the test room for brief periods during angular deceleration, or immediately after termination of deceleration. Trials were otherwise in total darkness. Both primary nystagmus and primary sensations of vertigo were markedly shortened during the periods of darkness subsequent to the intervals of light. In addition, strong secondary reactions (both nystagmus and vertigo) frequently followed the vision-attenuated primary responses.

Author

**N69-33138#** IIT Research Inst., Chicago, Ill.

**SURVEY OF THERMAL CONTROL TECHNIQUES FOR EXTRAVEHICULAR SPACE SUITS Final Report, 1 Mar. 1966-1 Mar. 1968**

Jack C. Hedge Dec. 1968 28 p refs (Contract AF 33(615)-3468) (AD-687149; IITRI-J6028-1; AMRL-TR-68-87) Avail: CFSTI CSCL 6/17

Thermal protection of the extravehicular astronaut was studied with particular attention to the relationship between thermal protection and mobility. The space thermal environment was reviewed with respect to the sources and magnitudes of heat energy delivered to the astronaut. The astronaut's thermal physiology was investigated. The basic thermal processes available for controlling the space suit temperature were considered and the state-of-the-art of active and passive thermal control systems was reviewed. The study concludes that a passive system alone cannot provide adequate extravehicular thermal protection. Recommendations are made for investigating hybrid thermal control systems and for studying means to improve the thermal protection of gloves with adequate tactility.

Author (TAB)

**N69-33172#** School of Aerospace Medicine, Brooks AFB, Tex. **AUTOMATIC DETECTION AND DISPLAY OF ARRHYTHMIAS IN LONG TERM ECG RECORDINGS**

Edward J. Engelken Jan. 1969 18 p refs (AD-687082; SAM-TR-69-7) Avail: CFSTI CSCL 6/12

A computerized technic was developed to detect and display arrhythmias in long-term ECG recordings. This scheme consists of a high-speed cardiometer to determine beat-to-beat heart rate and a detection circuit to detect sudden rate changes. Data are processed at 7.5 times recorded speed, and the arrhythmic ECG complexes are displayed on an oscillographic recorder producing a permanent record.

Author (TAB)

**N69-33180#** George Washington Univ., Alexandria, Va. Human Resources Research Office.

**PREDICTION OF AVIATOR PERFORMANCE**



Wallace W. Prophet Feb. 1969 17 p Presented at Army Aviation Instructors Conf., Fort Rucker, Ala., Aug. 1968 /ts Profess. Paper No. 5-6S  
(Contract DA-44-188-ARO-2)  
(AD-686619) Avail: CFSTI CSCL 5/9

Approaches to the prediction of three specific kinds of aviator performance are discussed: (1) in flight training or school, (2) in combat, (3) with respect to career decision. Within the school setting the psychometric reliability of flight performance evaluation is treated, as in the prediction of flight performance on the basis of trainee performance on a captive helicopter training device. The interaction of self-confidence in dangerous situations with the acquisition of flight skills and with effective performance under combat stress is discussed; flight trainee volunteers are more self-confident than similar, but non-aviation, trainees, and degree of confidence is related to pass-fail in flight training. Integration of many diverse quantitative descriptors of aviator performance into a multiple predictor system is described. The aim of the system would be to provide time and usable information to Army personnel management and training decision-makers. Author (TAB)

**N69-33188#** Lockheed Missiles and Space Co., Sunnyvale, Calif.  
**HUMAN FACTORS AND BIOTECHNOLOGY: A STATUS SURVEY FOR 1968-1969 Final Report, May 1968-May 1969**  
Jack A. Kraft Apr. 1969 432 p refs  
(Contract N00014-68-C-0378)  
(AD-687488; LMSC-687154) Avail: CFSTI CSCL 5/9

The report deals with the findings of a survey of over 500 human factors and biotechnology programs in U.S.A. Business and Industry, consulting, Government, non-profit research and educational organizations. The survey gathered information relative to: size of human factors and biotechnology (HF-B10) organizations; growth of the profession, turnover rates, reporting levels, group composition, qualifications for HF-B10 people, academic degrees, hiring sources, hiring methods, salaries, sources of program support, activities, facilities, computer usage, publications, presentations, professional society membership, and meeting attendance, films, work aids and devices, professional development, projected growth of field, HF-B10 educational programs, degrees offered, apprenticeships, number of students trained, problems associated with the HF-B10 field, means for increasing the effectiveness of the profession and trends. Author (TAB)

**N69-33190#** Joint Publications Research Service, Washington, D.C.  
**TRANSLATIONS ON EASTERN EUROPE. SCIENTIFIC AFFAIRS NO. 60: DEVELOPMENT OF METEOROLOGICAL ROCKETS OUTLINED**  
Jerzy Harazny 18 Jul. 1969 6 p refs Transl. into ENGLISH from Skrzydl. Polska (Warsaw), no. 19, 11 May 1969 p 9-11  
(JPRS-48451) Avail: CFSTI

An overview is presented on the Polish development of a light rocket, Meteor-1, for measuring winds in upper atmospheric layers using dipoles ejected from the rocket at an altitude of 35 km. After a technico-economic analysis, a two-stage system was adopted, consisting of a solid fuel engine for the first stage, and a fuel-less second stage, or capsule, containing an explosive-ejected dipole load. The problems involved in designing and developing the Meteor-2 are also discussed. For this heavier multipurpose rocket, a one-stage configuration was adopted with a capsule which is fired at 60 km to eject the meteorological measurement sonde. Both the sonde and the rocket are equipped with parachutes for earth recovery. For the Meteor-3, a three-stage system was used, consisting of two engines linked in tandem, topped by a fuel-less capsule. The individual stages of the rocket were joined into a single rigid whole with the aid of self-braking couplings, permitting the successive explosive separation of engines. In relation to Meteor-1, the cost of developing Meteor-2 was 5.7 times greater. Meteor-3 development costs were 2.4 times less. M.G.J.



## IAA ENTRIES

## A69-32929 #

MYOCARDIAL CHANGES IN RABBITS AFTER GENERAL CHRONIC IRRADIATION (ACCORDING TO KARYOMETRIC DATA) [IZMENE-NIA MIKARDA U KROLIKOV POSLE OBSHCHEGO KHRO-NICHESKOGO OBLUCHENIA (PO DANNYM KARIOMETRII)].

E. I. Vorob'ev and R. P. Stepanov.  
*Kosmicheskaya Biologiya i Meditsina*, vol. 3, Mar.-Apr. 1969,  
p. 3-9. 35 refs. In Russian.

Investigation of chronic exposure to ionizing radiation on the myocardium of rabbits. The test animals were exposed to total-body irradiation in total doses of 500, 1500, and 2400 r. The tissue changes were assessed with the aid of histological and karyometric techniques. A decrease in the nuclei of the muscular elements of the myocardium, observed after ten days of exposure to any of the doses employed, is attributed to a lower cardiac activity and to cardiac hypotrophy and dystrophy. V. P.

## A69-32930 #

EFFECT OF THE ALCOHOL-SOLUBLE FRACTION OF A BIOMASS OF PROTOCOCCI SEAWEEDS ON THE ORGANISM OF WHITE RATS [VLIYANIE SPIRITORASTVORIMOY FRAKTSII BIOMASSY PROTOKOKKOVYKH VODOROSLEI NA ORGANIZM BELYKH KRYIS].

A. V. Novikova, N. S. Kliushkina, and V. I. Fofanov.  
*Kosmicheskaya Biologiya i Meditsina*, vol. 3, Mar.-Apr. 1969,  
p. 9-12. 8 refs. In Russian.

Investigation of the condition of a group of 40 male white rats kept for 50 days on a diet containing the alcohol-soluble fraction of *Chlorella* and *Scenedesmus* biomass. Structural and histochemical changes are established in the adrenal cortex and renal glomerulus of experimental rats which received a biomass unbleached with alcohol. It is believed that a biomass of these seaweeds can be used as food only after extraction with alcohol. V. Z.

## A69-32931 #

PROTECTIVE ACTION OF ANTIHYPOXIC PREPARATIONS UNDER GRAVITATIONAL ACCELERATIONS [ZASHCHITNOE DEISTVIE ANTIGIPOKSICHESKIKH SREDSTV PRI GRAVITATSIONNYKH PEREGRUZKAKH].

V. M. Vinogradov and L. V. Pastushenkov.  
*Kosmicheskaya Biologiya i Meditsina*, vol. 3, Mar.-Apr. 1969,  
p. 12-16. 7 refs. In Russian.

Investigation of the effect of a total of ten unidentified anti-hypoxic preparations on the acceleration stability of a group of more than 1500 white mice and 250 rats subjected for 1 min 10 sec to accelerations ranging from 41.2 to 74.4 g in a head-to-pelvis direction in a centrifuge contained in a pressure chamber under pressures corresponding to altitudes of up to 11 km. The preparations were administered subcutaneously 30 to 60 min prior to the test. The survival rates of the experimental animals after exposure for 45 min to an altitude of 11 km at an ascent velocity of 5 km in the first minute and 1 km in each successive minute suggest a positive effect of these preparations on the acceleration resistance of mice and rats. V. Z.

## A69-32932 #

CERTAIN METABOLISM CHARACTERISTICS IN ANIMALS DURING A PROLONGED STAY IN A NITROGEN- AND HELIUM-DILUTED HYPEROXIC ATMOSPHERE [NEKOTORYE POKAZATELI OBMENA VESHCHESTV U ZHIVOTNYKH PRI DLITEL'NOM PREBYVANII V GIPEROKSICHESKOY ATMOSFERE S AZOTNYM I GELIEVYM RAZBAVLENIE].

A. G. Zhironkin and G. V. Troshikhin.

*Kosmicheskaya Biologiya i Meditsina*, vol. 3, Mar.-Apr. 1969,  
p. 16-20. 28 refs. In Russian.

Study of the oxygen consumption and rectal temperature in a group of 60 male mice confined for nine days in chambers containing 80% oxygen and 20% helium or nitrogen. The temperature was maintained at 20 to 23°C, while the humidity ranged from 85 to 95%. A gas analyzer was used for determining the gas composition twice a day, and electric thermometers were used for measuring the rectal temperature. The gas metabolism of the mice exposed to an oxygen-helium atmosphere remained unchanged through the fifth day of the experiment and then became 15 to 25% lower than that of control mice, while in an oxygen-nitrogen atmosphere it gradually decreased by about 20% between the second and fifth day and then remained unchanged to the end of the experiment. Changes in the rectal temperature were also observed during the experiment. V. Z.

## A69-32933 #

GAS EXCHANGE IN SOME VEGETABLE PLANTS IN THE PRESENCE OF AN INCREASED OXYGEN CONTENT IN THE GAS MEDIUM [GAZOBMEN NEKOTORYKH OVOSHCHNYKH RASTENII PRI POVYSHENNOM SODERZHANII KISLORODA V GAZOVOI SREDE].

N. T. Nilovskaia.  
*Kosmicheskaya Biologiya i Meditsina*, vol. 3, Mar.-Apr. 1969,  
p. 20-25. 11 refs. In Russian.

Study of the photosynthesis and respiration rates in sugar beet, potato, head cabbage, and Chinese cabbage plants kept for 4 to 16 days in sealed chambers with controlled temperature, humidity, CO<sub>2</sub> and O<sub>2</sub> contents, and illumination levels. The oxygen and carbon dioxide contents varied from 21 to 49% and from 0 to 0.5%, respectively. The temperature was 21°C, the humidity was 65 ± 5%, and the illumination varied from 50 to 200 W/m<sup>2</sup>. A gas analyzer continuously recorded the CO<sub>2</sub> and O<sub>2</sub> variations in the medium. The photosynthetic activity of these plants was depressed, and their dark respiration rates were higher when the oxygen partial pressure was above 160 mm Hg. V. Z.

## A69-32934 #

PECULIARITIES OF VESTIBULAR REACTIONS IN RATS UNDER CONDITIONS OF ARTIFICIAL HYPOTHERMIA [OSOBENNOSTI PROTEKANII VESTIBULARNYKH REAKTSII U KRYIS V USLO-VIYAKH ISKUSSTVENNOY GIPOTERMII].

I. I. Voinova and M. D. Emel'yanov.  
*Kosmicheskaya Biologiya i Meditsina*, vol. 3, Mar.-Apr. 1969,  
p. 25-30. 9 refs. In Russian.

Investigation of the vestibular reactions of a group of 34 white rats subjected to hypothermal conditions by exposure to hypoxia and hypercapnia or by administering pipolfen and promedol in a total of 283 experiments. Stop-stimuli with accelerations at angular velocities up to 800 deg/sec were applied to determine the vestibular function of the experimental rats by measuring the duration and the number of beats of the postrotatory nystagmus, the respiration rates, and the rectal temperature. The various effects of the artificial hypothermia on these functions are discussed. V. Z.

## A69-32935 #

DIURNAL PERIODICITY OF THE PHYSIOLOGICAL FUNCTIONS OF THE ORGANISMS OF FLIGHT PERSONNEL [K VOPROSU O SUTOCHNOY PERIODIKE FIZIOLOGICHESKIKH FUNKTSII ORGANIZMA U LETNOGO SOSTAVA].

A. V. Chapek.  
*Kosmicheskaya Biologiya i Meditsina*, vol. 3, Mar.-Apr. 1969,  
p. 30-35. 13 refs. In Russian.

Study of the diurnal periodicity of the body temperature, heart beat rates, blood pressure, EKG, minute heart volume, higher nervous activity, motor activity during sleep, cardiovascular system, and visual analyzer in a group of aircraft crew members who fly regularly west to east and vice versa through several time zones. It is found that the diurnal rhythm of most of these functions tends to correspond to the time zone of the permanent residence of the crew members. It is pointed out that recommendations concerning the working and leisure time of flight personnel were made on the basis of this study. V. Z.

**A69-32936 #**

EFFECT OF A "FRACTIONAL" REGIME OF DAILY ACTIVITY ON THE HUMAN ORGANISM UNDER CONDITIONS OF RELATIVE ISOLATION [VLIANIE NA ORGANIZM CHELOVEKA "DROBNOGO" REZHIMA SUTOCHNOI DEIATEL'NOSTI V USLOVIYAKH OTNOSITEL'NOI IZOLIATSII].

B. A. Dushkov, A. N. Zolotukhin, A. V. Korobkov, and F. P. Kosmolinskii.

*Kosmicheskaya Biologiya i Meditsina*, vol. 3, Mar.-Apr. 1969, p. 35-40. 11 refs. In Russian.

Study of the general conditions, cardiovascular system, neuromuscular activity, and mental fitness of a group of six subjects performing various physical assignments and mental tests according to prescribed activity/rest schedules during a seven-day confinement in a sealed chamber in a series of four experiments. The temperature ranged from 21 to 23.6°C, the humidity varied between 45 and 70%, the composition of the air was maintained within a hygienic standard, the noise level was not above 60 to 65 dB, and the illumination ranged from 150 to 170 lux. Suggestions are made as to how human adaptation to such conditions could be facilitated and the performance improved. V. Z.

**A69-32937 #**

CHANGES IN PRECISE MOTIONS OF PERSONS WITH VARIOUS DEGREES OF PHYSICAL PREPAREDNESS UNDER THE EFFECTS OF HYPOKINESIA [IZMENENIE TOCHNYKH DVIZHENII U LITS RAZLICHNOI FIZICHESKOI PODGOTOVLENNOSTI POD VLIANIEM GIPOKINEZII].

A. A. Korobova and T. I. Goriunova.

*Kosmicheskaya Biologiya i Meditsina*, vol. 3, Mar.-Apr. 1969, p. 41-45. 27 refs. In Russian.

Study of the coordination of motor activity in a group of five runners and five weight lifters subjected to 40 days of bed rest, by using a dynamographic technique. The possible nature of the slackening of the coordination capacity, observed in the subjects after this period, is discussed. It is pointed out that the successful completion of a physical assignment alone should not be regarded as proof of normal coordination of motions under extremal conditions. Further studies of this problem are suggested. V. Z.

**A69-32938 #**

COORDINATION OF HUMAN MOTIONS UNDER INTERMITTENT EFFECTS OF ACCELERATIONS AND WEIGHTLESSNESS [KOORDINATSIIA DVIZHENII CHELOVEKA PRI PEREMEZHAISHCHEMSIA VOZDEISTVII PEREGRUZOK I NEVESOMOSTI].

M. A. Cherepakhin.

*Kosmicheskaya Biologiya i Meditsina*, vol. 3, Mar.-Apr. 1969, p. 45-49. 8 refs. In Russian.

Study of the motor activity coordination in inexperienced subjects during jet flights along Keplerian orbits with accelerations of up to 2 to 2.5 g, lasting 10 to 15 sec, followed by weightlessness for 18 to 25 sec. The disturbance in motor activity coordination, occurring systematically during the initial seconds of weightlessness and gradually subsiding during subsequent orbits, is discussed. V. Z.

**A69-32939 #**

EFFECT OF PROLONGED HYPOKINESIA ON THE RESISTANCE OF THE HUMAN ORGANISM TO PHYSICAL STRESS [VLIANIE DLITEL'NOI GIPOKINEZII NA USTOICHIVOST' ORGANIZMA CHELOVEKA K FIZICHESKOI NAGRUZKE].

B. S. Katkovskii, O. A. Piliavskii, and G. I. Smirnova.

*Kosmicheskaya Biologiya i Meditsina*, vol. 3, Mar.-Apr. 1969, p. 49-55. 15 refs. In Russian.

Investigation of the physical fitness of a group of 60 young male subjects restricted to 62 days of bed rest in a prone position, with or without physical exercises with a daily energy requirement in excess of 1000 kcal. Prior to and after the bed rest, the subjects were exposed to transverse accelerations increasing at a rate of 0.1 to 0.2 g/sec to a level of 12 to 14 g. A veloergometer with a rate of rotation of the pedals of 60 to 70 rpm was used to determine the physical endurance of the subjects after the experiment. The favorable effect of physical exercises during the bed rest on the physical condition of the subjects is noted. V. Z.

**A69-32941 #**

A METHOD OF MEASURING PHYSIOLOGICAL CHARACTERISTICS WITH THE AID OF A DIGITAL COMPUTER [OB ODNOM SPOSOBE IZMERENIIA FIZIOLOGICHESKIKH POKAZATELEI S POMOSHCH'YU ETsVM].

A. P. Kalinovskii.

*Kosmicheskaya Biologiya i Meditsina*, vol. 3, Mar.-Apr. 1969, p. 60-65. In Russian.

Development of a theoretical basis for a digital computer program in studying various features of physiological activity. The difficulties encountered when the Kotelnikov theorem (1956) is used to describe the time-variation of physiological signals are noted. Principles are outlined for the interpolation of mathematical functions describing the time variations of physiological signals with required accuracy, using a reduced volume of computer-fed information. V. Z.

**A69-32940 #**

USE OF A TWO-GAS ARTIFICIAL ATMOSPHERE IN MANNED SPACECRAFT [O PRIMENENII DVOKHGAZOVOI ISKUSSTVENNOI ATMOSFERE V OBITAEMYKH KOSMICHESKIKH KORABLLAKH].

E. V. Bondarev, A. M. Genin, G. I. Gurvich, M. D. Draguzia, V. A. Egorov, Ju. N. Eleshin, M. P. Elinskii, O. K. Erykalova, Z. N. Parfenova, and V. V. Rassvetaev.

*Kosmicheskaya Biologiya i Meditsina*, vol. 3, Mar.-Apr. 1969, p. 55-59. In Russian.

Pressure-chamber investigation of the effects of a 10-hr exposure to a 405-mm Hg atmosphere of nitrogen with 45 to 47% oxygen followed by a 4-hr exposure to 170 mm Hg of pure oxygen

on the heart beat and respiration rates, EKG, pulmonary ventilation, blood gas content, and blood alkali content of a group of 100 young male subjects. The investigation was designed to simulate the conditions experienced by astronauts during extravehicular activity. An analysis of the results indicates no significant and persisting changes in these functions of the subjects during or after exposures. V. Z.

**A69-32942 #**

PHAGOCYTIC ACTIVITY AND CERTAIN CHARACTERISTICS OF THE CARBOHYDRATE METABOLISM IN NEUTROPHILS OF MEN EXPOSED TO AN ATMOSPHERE WITH INCREASED OXYGEN CONTENT [FAGOTSITARNAYA AKTIVNOST' I NEKOTORYE POKAZATELI UGLEVOODNOGO OBMENA NEITROFILOV U LIUDEI, NAKHODIVSHIKHSIA V ATMOSFERE S POVYSHENNYM SODERZHANIEM KISLORODA].

A. S. Kaplanskii, G. N. Durnova, I. R. Kalinichenko, V. V. Portugalov, and N. A. Agadzhanian.

*Kosmicheskaya Biologiya i Meditsina*, vol. 3, Mar.-Apr. 1969, p. 65-68. 23 refs. In Russian.

Study of the phagocytic activity and carbohydrate metabolism in the peripheral blood neutrophils of a group of four persons exposed for 10 or 14 days to an atmosphere of 53 or 40% oxygen, respectively. A progressive suppression of the phagocytic activity is established in both subjects exposed to an atmosphere of 53% oxygen, while no such symptoms were established in one of the two subjects exposed to an atmosphere with 40% oxygen. An analysis of the carbohydrate mechanism in the blood of the subjects indicates that disorders in the neutrophil energy exchange, rather than a glycogen deficiency, are the basic cause of the phagocytic activity suppression during hyperoxia. V. Z.

**A69-32943 #**

CONVEYER GROWING OF CARROTS BY THE AEROPONIC METHOD [KONVEIERNOE VYRASHCHIVANIE MORKOVI SPOSOBOM AEROPONIKI].

E. V. Lebedeva, L. V. Dmitrieva, M. V. Vil'iams, and V. M. Simonov.

*Kosmicheskaya Biologiya i Meditsina*, vol. 3, Mar.-Apr. 1969, p. 69, 70. In Russian.

Brief description of an experiment in which a total of 432 carrot plants were grown during a period of 374 days on an area of 1 m<sup>2</sup> in a conveyor-type aeroponic assembly based on a principle proposed by Artsikhovskii in 1910. A total of 90 crops of 90-day old plants were harvested over a period of 270 days. The total yield of tubers

was 9 kg for a vegetation period. The peculiar morphological features found in carrot plants grown by this technique are discussed.  
V. Z.

#### A69-32944 #

OCCURRENCE OF CHROMOSOME REARRANGEMENTS IN THE CORNEAL EPITHELIUM OF MICE DURING PROLONGED GENERAL GAMMA IRRADIATION [VOZNIKOVENIE KHROMOSOMNYKH PERESTROEK V EPITELII ROGOVITSY MYSHEI PRI OBSHCHEM PROLONGIROVANNOM  $\gamma$ -OBLUCHENII].

T. M. Zuhbaia, B. A. Markelov, and N. A. Popova.

*Kosmicheskaya Biologiya i Meditsina*, vol. 3, Mar.-Apr. 1969, p. 71, 72. In Russian.

Study of the occurrence of chromosome rearrangements in the corneal epithelium of a group of 350 white adult mice exposed for 0.002, 0.003, 0.009, and 20 hr over periods of up to 170 days to gamma radiation from a  $\text{Co}^{60}$  source. Distinct chromosome aberrations were established only when the radiation dose was 75 r or higher.  
V. Z.

#### A69-32967

EXOBIOLOGY: THE SEARCH FOR EXTRATERRESTRIAL LIFE; AMERICAN ASTRONAUTICAL SOCIETY AND AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, SYMPOSIUM, NEW YORK, N.Y., DECEMBER 30, 1967, PROCEEDINGS.

Edited by M. M. Freundlich (Cutler-Hammer, Inc., Airborne Instruments Laboratory Div., Deer Park, N.Y.) and B. M. Wagner (Columbia University, College of Physicians and Surgeons, New York, N.Y.).

Tarzana, Calif., American Astronautical Society (AAS Science and Technology Series. Volume 19), 1969. 183 p.

Members, \$7.35; nonmembers, \$9.75.

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SOCIOLOGICAL ASPECTS OF EXOBIOLOGY. B. M. Wagner (Columbia University, New York, N.Y.), p. 117-130. [See A69-32974 17-34]

DISCUSSIONS, p. 131-172.

#### A69-32968

FRONTIERS IN SOLAR SYSTEM EXOBIOLOGY.

Carl Sagan (Cornell University, Center for Radiophysics and Space Research, Ithaca, N.Y.).

IN: EXOBIOLOGY: THE SEARCH FOR EXTRATERRESTRIAL LIFE; AMERICAN ASTRONAUTICAL SOCIETY AND AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, SYMPOSIUM, NEW YORK, N.Y., DECEMBER 30, 1967, PROCEEDINGS. [A69-32967 17-04]

Edited by M. M. Freundlich and B. M. Wagner.

Tarzana, Calif., American Astronautical Society (AAS Science and Technology Series. Volume 19), 1969, p. 1-11.

Brief survey of the physical environments and possible exobiological interest of the moon and planets. The surfaces of

Mercury and the moon are probably too hostile for indigenous life; their subsurfaces are more clement, but there exists no apparent energy source to drive an ecological system. Locales of particular exobiological interest are the lower clouds of Venus and Jupiter, and aqueous microenvironments of Mars. The fundamental significance of exobiology for biology - whatever the outcome of our searches for life - is extremely great. (Author)

#### A69-32969 \*

AUTOMATED MICROBIAL METABOLISM LABORATORY.

Gilbert V. Levin (Biospherics Research, Inc., Washington, D.C.).

IN: EXOBIOLOGY: THE SEARCH FOR EXTRATERRESTRIAL LIFE; AMERICAN ASTRONAUTICAL SOCIETY AND AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, SYMPOSIUM, NEW YORK, N.Y., DECEMBER 30, 1967, PROCEEDINGS. [A69-32967 17-04]

Edited by M. M. Freundlich and B. M. Wagner.

Tarzana, Calif., American Astronautical Society (AAS Science and Technology Series. Volume 19), 1969, p. 13-28.

NASA-supported research.

Description of six experiments to detect extraterrestrial life through measuring metabolism and growth in planetary surface material, which are now being integrated into a single automated laboratory. The experiments monitor uptake of radioactive substrates, photosynthesis of metabolically derived radioactive carbon dioxide, photosynthesis through fixation and endogenous respiratory release of labeled gaseous carbon dioxide, uptake of phosphate from solution, incorporation of labeled sulfate, and the presence and production of adenosinetriphosphate. Each of the experiments will consist of a test and inhibited control. The principal sensor(s) will be a shared radiation detector and/or a photomultiplier tube. Secondary sensors will measure pH, temperature, and oxygen in the culture. The sensors will also be used to measure background radiation, ambient light intensity, surface pH, atmospheric oxygen, soluble phosphate in the surface material, and ambient temperature at the solid-atmospheric interface of the planet. Experimental data obtained in the laboratory and in the field are presented. (Author)

#### A69-32970 \*

LIFE DETECTION TECHNIQUES.

Richard S. Young (NASA, Washington, D.C.).

IN: EXOBIOLOGY: THE SEARCH FOR EXTRATERRESTRIAL LIFE; AMERICAN ASTRONAUTICAL SOCIETY AND AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, SYMPOSIUM, NEW YORK, N.Y., DECEMBER 30, 1967, PROCEEDINGS. [A69-32967 17-04]

Edited by M. M. Freundlich and B. M. Wagner.

Tarzana, Calif., American Astronautical Society (AAS Science and Technology Series. Volume 19), 1969, p. 29-35.

Discussion of the rationale for life detection, including the reasons for the approaches that are taken. The problem of detecting life on an extraterrestrial body requires some degree of experimental sophistication. The single long-shot experiment is considered unlikely to produce unequivocal data, so that a multiple experiment approach is recommended. A discussion is presented of the types of experiments most likely to produce data interpretable as a function of life processes. These experiments include chemical analyses, identification of metabolic activity and evidence for growth and replication at the molecular and/or cellular level. All of these experiments are considered in the light of the realities of planetary mission capability. A discussion is offered concerning the problems of integrating such varied experiments into a single multipurpose laboratory concept. (Author)

#### A69-32972

THE ORIGIN OF MICROBIAL LIFE ON EARTH AND ITS IMPLICATIONS FOR EXTRATERRESTRIAL FORMS.

Henry D. Isenberg (Long Island Jewish Hospital, Dept. of Laboratories, New Hyde Park; New York, State University, Downstate Medical Center, Brooklyn, N.Y.).

IN: EXOBIOLGY: THE SEARCH FOR EXTRATERRESTRIAL LIFE; AMERICAN ASTRONAUTICAL SOCIETY AND AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, SYMPOSIUM, NEW YORK, N. Y., DECEMBER 30, 1967, PROCEEDINGS. [A69-32967 17-04]

Edited by M. M. Freundlich and B. M. Wagner. Tarzana, Calif., American Astronautical Society (AAS Science and Technology Series. Volume 19), 1969, p. 63-95. 34 refs.

Discussion of various possible paths leading from prebiotic organic molecules to the first living terrestrial forms and of the possible transportation of selected microorganisms to other planets for initiating microbial life. The need for information on atmospheric and planet surface composition, as well as on climatic variations, is stressed for the proper selection of compounds unequivocally microbial and tailored to the specific requirements of each planet. Carefully selected microorganisms can be seeded on such extraterrestrial bodies to initiate a sequence of events which, when properly ministered and supplemented, may lead to conditions permitting the use of a planet's resources. Z.W.

#### A69-32973

BIOCHEMICAL BASES FOR LIFE IN EXTRATERRESTRIAL ENVIRONMENTS.

Wolf Vishniac (Rochester, University, Dept. of Biology and Space Science Center, Rochester, N. Y.).

IN: EXOBIOLGY: THE SEARCH FOR EXTRATERRESTRIAL LIFE; AMERICAN ASTRONAUTICAL SOCIETY AND AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, SYMPOSIUM, NEW YORK, N. Y., DECEMBER 30, 1967, PROCEEDINGS. [A69-32967 17-04]

Edited by M. M. Freundlich and B. M. Wagner. Tarzana, Calif., American Astronautical Society (AAS Science and Technology Series. Volume 19), 1969, p. 97-116. 5 refs.

Discussion of electron transport as the source of energy for any living organisms in any environment. This electron transport may be initiated by the absorption of radiant energy, or by reducing a suitable electron acceptor at the expense of oxidizable material. It is shown that, in order for a population to thrive in a particular environment, many biochemical types must cooperate to balance the chemical events which fuel their physiological activities. The earth system, in which oxygen acts as the major important electron buffer, by giving up electrons in photosynthesis, and accepting electrons in respiration, is discussed, and balanced systems for other environments are postulated. B.H.

#### A69-33007

ANALOG STUDIES OF THE HUMAN SYSTEMIC ARTERIAL TREE. Nicolaas Westerhof, Frederik Bosman, Cornelis J. de Vries, and Abraham Noordergraaf (Pennsylvania, University, Moore School of Electrical Engineering, Dept. of Biomedical Engineering, Philadelphia, Pa.).

*Journal of Biomechanics*, vol. 2, May 1969, p. 121-143. 50 refs. Research supported by the Washington Heart Association; PHS Grants No. HE-10330; No. H-7383; No. GM-10985; Contract No. FA-2021.

Design, construction, and evaluation of a linear passive model of the human systemic arterial tree. The performance of this electrical model is compared extensively to its real counterpart in the areas of magnitude and phase of input impedances, wave travel (amplitude and phase of pressure harmonics) along the aorta, and wave shapes of pressures and flows at different locations. These comparisons demonstrate that the model behaves very much like the real system. A series of refinements in the modeling of a short segment of artery is discussed; although these refinements help to obtain better agreement with reality, none has a major effect on the behavior of the model as measured close to the heart. Reflections play a major role in determining the behavior of the system and occur at all branch points. The largest reflection coefficients are found at the periphery. These reflection coefficients result mainly from the architecture of the arterial tree. It is shown how the nature of the input impedance and wave travel pattern can be explained in terms of these reflections. The input impedance and wave travel in large vessels, for frequencies larger than 2 cps, are largely determined by the characteristics of these vessels

themselves and not by the load. This is mainly due to the architecture of the system. Alterations in peripheral resistance affect the input impedance of the system only for very low frequencies; the same holds for wave travel in the aorta - the high frequencies are virtually independent of the peripheral resistance. Some clinical states are simulated and discussed. (Author)

#### A69-33008

TOWARDS A STRESS CRITERION OF INJURY - AN EXAMPLE IN CAUDOCEPHALAC ACCELERATION.

Y. King Liu (Michigan, University, Dept. of Engineering Mechanics, Ann Arbor, Mich.).

*Journal of Biomechanics*, vol. 2, May 1969, p. 145-149. 12 refs. PHS Grant No. UI-00025-02.

Analysis of various models to obtain a stress criterion of injury for pilots subjected to high acceleration. It is found that the usual specification of acceleration (in number of g's) as the injury criterion in the biodynamic response of the human body to vibration and/or shock is quite misleading if not invalid. An injury criterion based on stress (or strain) is proposed and shown to have the potential of deciding where, when, and how injury is sustained. An example in pilot ejection is used for illustration. G.R.

#### A69-33009 \*

A DISCUSSION OF THE PROBLEMS OF RESTRAINT IN EXPERIMENTAL INVESTIGATIONS OF ACCELERATION INJURY.

Donald J. Sass (National Naval Medical Center, Naval Medical Research Institute, Bethesda, Md.).

*Journal of Biomechanics*, vol. 2, May 1969, p. 157-162. 13 refs. NASA Contract No. R-10.

Discussion of problems of restraint that are encountered in experimental studies of injury due to acceleration. Injury and restraint are discussed in the context of experimental injury studies. A water immersion restraint is described which has been used in an investigation of lung injury in cats due to intense whole body vibration. It is found that restraint is an extremely important factor in any experimental study of injury from acceleration. The water immersion restraint affords a simple solution to the basic problems discussed. G.R.

#### A69-33168

EFFECT OF DIPHENIDOL AND PROCHLORPERAZINE ON SEMI-CIRCULAR CANAL FUNCTION IN MAN.

A. J. Benson (Royal Air Force, Institute of Aviation Medicine, Farnborough, Hants., England).

*Acrospase Medicine*, vol. 40, June 1969, p. 589-595. 29 refs.

In a double-blind cross-over trial, 12 subjects were given by mouth, diphenidol (30 mg), prochlorperazine (10 mg), or an inert substance, 90 min before rotational tests were performed. Neither drug produced a significant change in the sensation cupulogram, in the decay of subjective angular velocity and of nystagmus following 60°/sec impulses, or in subjective estimates of angular displacement (20-100° in less than 4 sec). However, subjects' overall assessment of the intensity of their sensations of turning obtained at the end of each test session was significantly reduced by diphenidol. The failure of the drugs to alter evoked vestibular responses at dose levels which gave significant side effects (dry mouth with diphenidol and drowsiness with prochlorperazine) suggested that their site of action was other than on the primary vestibular projections. (Author)

#### A69-33169

EVALUATION OF HEAD PROTECTION IN AIRCRAFT.

Channing L. Ewing (U.S. Naval Aviation Medical Center, Aerospace Medical Institute, Pensacola, Fla.) and A. Marshall Irving (U.S. Naval Aviation Medical Center, Aerospace Medical Institute, Pensacola, Fla.; Dayton T. Brown, Inc., Bohemia, N. Y.).

(Aerospace Medical Association, Annual Scientific Meeting, 38th, Washington, D. C., Apr. 10-13, 1967.)

*Aerospace Medicine*, vol. 40, June 1969, p. 596-599. 7 refs.

Discussion of the development of test methods for evaluating head protection devices. Impact protection is the single most important function of a crash helmet. Test methods for evaluation of the protection provided by aircraft crash helmets against impact should include means for determining the impact ultimate protective capability of the helmets and of the effects of different types of impact. Testing of helmet components on a statistical basis was evaluated as a possible screening method. The work conducted has wide application in the development, evaluation, and adoption of test methods and performance specifications for aviator's crash helmets, as well as in the development and evaluation of the helmets themselves. G. R.

#### A69-33170

##### GASTRIC BLOOD FLOW AND ITS DISTRIBUTION DURING RESTRAINT.

Richard F. Edlich, Luis Urdaneta, and Carl Hansen (Minnesota, University, Medical School, Dept. of Surgery, Minneapolis, Minn.). *Aerospace Medicine*, vol. 40, June 1969, p. 600-602.

Gastric blood flow and its distribution were determined in control animals and dogs undergoing restraint by the  $^{86}\text{Rb}$  clearance technique. The gastric perfusion rate of the restrained animal was significantly lower than the gastric perfusion rate of the controls. The reduction in the gastric perfusion rate of the experimental group may be a consequence of a significant decrease in cardiac output or a result of an undetermined intermediary affecting both the heart and the gastric microcirculation. (Author)

#### A69-33171 \*

##### CHANGES IN TOTAL LEG VOLUME DURING LOWER BODY NEGATIVE PRESSURE.

F. Story Musgrave (NASA, Manned Spacecraft Center, Houston, Tex.), Fred W. Zechman, and Richard C. Mains (Kentucky, University, Medical Center, Dept. of Physiology and Biophysics, Lexington, Ky.). (AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D. C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM, p. 219, 220.) *Aerospace Medicine*, vol. 40, June 1969, p. 602-606. 23 refs. Contracts No. AF 33(615)-67-C-1370; No. AF 33(615)-3311. [For abstract see issue 23, page 3955, Accession no. A67-41619]

#### A69-33172

##### ACTION OF SELECTED DRUGS ON DECOMPRESSION SICKNESS IN RATS.

P. B. Bennett and A. J. Brock (Defence Research Establishment, Toronto, Ontario, Canada). *Aerospace Medicine*, vol. 40, June 1969, p. 607-610. 16 refs. Carbachol, prostigmin, adrenalin, hyoscine, doriden, phenacetin, aspirin, methedrine, megimide, leptazol, alcohol, gamma-aminobutyric acid, and thiethylperazine were administered to rats prior to compression with air at 60 ft/min to 13 atmospheres absolute for 1 hour, followed by decompression at 45 ft/min. The animals were observed for 30 min after decompression, and the numbers of rats that died or developed spinal bends were counted. Carbachol, doriden, phenacetin, adrenalin, and leptazol caused significant increases in deaths or spinal bends. Megimide and hyoscine showed a definite tendency to potentiate decompression sickness, although the results were not statistically significant. The remaining drugs had no effect. These results are compared with the action of the same drugs on nitrogen narcosis and oxygen toxicity. (Author)

#### A69-33173 \*

##### CHROMOSOME ANALYSES OF GEMINI ASTRONAUTS.

P. C. Gooch (Oak Ridge National Laboratory, Biology Div., Oak Ridge, Tenn.) and C. A. Berry (NASA, Manned Spacecraft Center, Medical Research and Operations Directorate, Houston, Tex.). *Aerospace Medicine*, vol. 40, June 1969, p. 610-614. 15 refs. NASA Contract No. R-104.

Pre- and postflight leukocyte chromosome aberration analyses were carried out on the Gemini astronauts. No large chromosomal effects of spaceflight were demonstrated. The small postflight increases in aberration levels observed after some of the missions could not be correlated with flight duration, isotope injection, or extravehicular activity. (Author)

#### A69-33174 #

##### VISUAL PERCEPTION BEYOND THE ATMOSPHERE.

H. N. Reynolds (USAF, Aerospace Medical Div., Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio). *Aerospace Medicine*, vol. 40, June 1969, p. 615-621. 28 refs.

Optical conditions beyond the atmosphere include an absence of diffuse illumination and the presence of nearly collimated solar rays, resulting in dark, sharply-defined shadows cast by illuminated objects. Such shadows may conceal surfaces across which they fall, thereby distorting the perceived shape of an object. The effects of these shadows on observer judgments of object shape were systematically investigated using thirteen solid and "planar" geometrical shapes, viewed under conditions simulating some of the characteristics of solar illumination in space. Results demonstrated that certain solid, three-dimensional objects (e.g., cube) will be perceived as planar, two-dimensional shapes (e.g., square) when shadow conceals all but one surface of the object. Results were also obtained for perceptual judgments of object size and distance under simulated space conditions. Problems of visual perception in space are discussed in relation to manned space flight maneuvers. (Author)

#### A69-33175

##### PAINTED HELICOPTER MAIN ROTOR BLADES AND FLICKER-INDUCED VERTIGO.

James A. Bynum (U.S. Army, Aeromedical Research Laboratory, Fort Rucker, Ala.) and John A. Stern (Washington University, Dept. of Psychology, St. Louis, Mo.). *Aerospace Medicine*, vol. 40, June 1969, p. 622-626. 11 refs.

Painting the main rotor blades of UH-1 helicopters led to the question of the possibility of flicker-induced vertigo in formation flights involving these helicopters. Two experiments were designed to answer the question. In the first, thirty students and eight instructors flew in formation flights consisting of helicopters with painted rotor blades. Immediately following the flights, their subjective responses were obtained and evaluated. In the second experiment, ten students were screened from a group of thirty-seven on the basis of psychophysiological data and subjective responses to laboratory photic stimulation. Seven of these ten then flew in formations while EEG, EOG, and eye-blink data were recorded. Subjective evaluations were also obtained immediately after the flights. There were no indications in either experiment to indicate the painted blades as a source of flicker vertigo. (Author)

#### A69-33176

##### MEASUREMENT OF ENDOGENOUS CARBON MONOXIDE PRODUCTION TO DETERMINE THE EFFECT OF HIGH $+G_x$ ACCELERATION ON THE DESTRUCTION RATE OF RED CELLS.

Charles A. Coltman, Jr., Guilford M. Dudley, III, and Sidney D. Leverett, Jr. (USAF, Wilford Hall Hospital, Lackland AFB; USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine*, vol. 40, June 1969, p. 627-631. 22 refs.

The data from the Gemini 4, 5, and 7 space flights document a mean decrease in red cell mass of 319 milliliters of red blood cells in the six astronauts. This decrease is considered to have been due to an uncompensated hemolysis of unknown cause. The mean life span and fractional destruction rate of the red cell mass have been determined by the technique of measuring endogenous carbon monoxide before and after the exposure of subjects to high  $+G_x$  acceleration forces. Replicate studies in normal uncentrifuged subjects were compared to those in which centrifugation was interposed. Analysis of variance of replicate studies indicates that centrifugation produces a significantly larger variation in replication when compared to controls. These data are compatible with the

## A69-33177

hypothesis that high  $+g_x$  acceleration forces, comparable to those experienced in association with exit and reentry from orbital space flight are associated with erythrocyte destruction. (Author)

## A69-33177

### FACTORS IN THE DESIGN OF PROTECTIVE HELMETS.

J. M. Rayne and K. R. Maslen (Ministry of Technology, Royal Aircraft Establishment, Human Engineering Div., Farnborough, Hants., England).

*Aerospace Medicine*, vol. 40, June 1969, p. 631-637. 10 refs.

Investigation of the degree of protection of the head which can be provided by a suitably designed helmet. A simple mathematical analysis suggests that effective protection against concussion cannot be given by a helmet of reasonable dimensions and weight alone. On the other hand, a high order of protection against skull fracture can be achieved by load spreading and full use of the space available for deflection. Rigs for the investigation of the dynamics of energy absorbing devices have been constructed and are discussed. G.R.

## A69-33178 \*

### RAPID VESTIBULAR ADAPTATION IN A ROTATING ENVIRONMENT BY MEANS OF CONTROLLED HEAD MOVEMENTS.

Ashton Graybiel and Charles D. Wood (U.S. Naval Aviation Medical Center, Aerospace Medical Institute, Pensacola, Fla.).

*Aerospace Medicine*, vol. 40, June 1969, p. 638-643. 10 refs. NASA Contract No. R-93.

Two attempts to telescope, in time, vestibular adaptation in a slow rotation room (SRR) were made to determine the easiest and quickest means of preventing the appearance of SRR sickness at a terminal velocity of 10 rpm. Three subjects in each experiment were exposed to unit increases in rotational velocity, at which time they made several hundred experimenter-directed head movements. Prior to cessation of rotation, standardized tasks were performed to determine the degree of transfer of adaptation acquired from the "directed" movements. The results demonstrate that the process of homeostatic adaptation can be greatly speeded up through experimental control of head movements although a large number of "limited" head motions must be made to ensure transfer of adaptation to general activities. Some idea was gained regarding the number and excursion of head movements required at each unit increase in rpm for adaptation and overadaptation at terminal velocity. (Author)

## A69-33179 \*

### EXTRAVASCULAR DEHYDRATION AS AN ETIOLOGIC FACTOR IN POST-RECUMBENCY ORTHOSTATISM.

Kenneth H. Hyatt, Leonid G. Kamenetsky, and William M. Smith (U.S. Public Health Service, Hospital, Cardiopulmonary Laboratory, San Francisco, Calif.).

*Aerospace Medicine*, vol. 40, June 1969, p. 644-650. 34 refs. NASA-supported research.

The hemodynamic and metabolic effects of two weeks of absolute bedrest have been evaluated in twenty normal volunteers. Post-recumbency tilting resulted in a more profound decrease in stroke volume and cardiac output than had been present before bedrest. This was coupled with a failure to augment stroke volume and cardiac output to prerenal levels during 50-watt exercise after bedrest. A large diuresis and saluresis occurred during bedrest. In spite of this, plasma volume was at prerenal levels at the end of two weeks of bedrest. It is suggested that the fluid loss must have been derived from extravascular compartments with resultant lowering of tissue pressure. It is likely that a large transudation of plasma water into lower extremity tissue spaces occurred during post-recumbency tilting. The resultant decrease in plasma volume during tilt would then account for the decrement in stroke volume and cardiac output during tilting and exercise. A possible mechanism for induction of vasodepressor syncope is hypothesized. (Author)

## A69-33180 #

### EFFECT OF LOWER BODY NEGATIVE PRESSURE UPON PULMONARY VENTILATION AND PERFUSION AS MEASURED USING XENON-133.

Anthony R. Dowell, Stephen F. Schaal, Richard Spielvogel, and Shirley A. Pohl (USAF, Aerospace Medical Div., Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio).

*Aerospace Medicine*, vol. 40, June 1969, p. 651-654. 13 refs.

Results of a study of the distribution of pulmonary ventilation and perfusion in 10 normal, supine subjects before and during exposure to -40 mm Hg lower body negative pressure (LBNP). Using the inhalation and intravenous injection of Xe-133, the ratio of ventilation per unit volume and perfusion per unit volume were assessed. Counters were placed anteriorly over the upper, middle, and lower lung as well as laterally over the dorsal and ventral lung. The changes in ventilation and perfusion distribution due to gravity were readily apparent, while exposure to LBNP had no effect. These data support the concept that the distribution of ventilation and perfusion in the normal lung is essentially gravity-dependent and that the changes in lung volume, mechanics, and perfusion produced by -40 mm Hg LBNP have no appreciable effect on this distribution. (Author)

## A69-33181 #

### PULMONARY FUNCTION DURING ZERO-GRAVITY MANEUVERS.

Mary F. Foley and J. F. Tomashefski (Ohio State University, College of Medicine, Columbus, Ohio).

(International Congress on Aviation and Space Medicine, 17th, Oslo, Norway, Aug. 8, 1968.)

*Aerospace Medicine*, vol. 40, June 1969, p. 655-657. 7 refs.

Study of pulmonary mechanics in normal subjects during zero-gravity maneuvers. The experimental laboratory was a KC-135 aircraft. A waterless spirometer was used to measure flows and volumes. Twelve subjects were studied during 30 Keplerian maneuvers. Forced expiratory volumes and flow rates were recorded during each phase of the maneuver: entry, zero-gravity, and pull-out. The most significant findings are reflected by the rate of airflow and the total time of the forced expiration. During zero-gravity, marked decrease in flow rate with no accompanying significant decrease in vital capacity was a consistent finding. G.R.

## A69-33182

### STUDY OF THE EFFECT OF CABIN ENVIRONMENT ON INSENSIBLE WATER LOSS.

W. D. Macnamara (Canadian Armed Forces, Ottawa, Canada) and A. N. Nicholson (Royal Air Force, Institute of Aviation Medicine, Farnborough, Hants., England).

*Aerospace Medicine*, vol. 40, June 1969, p. 657-659. 9 refs.

The excretion of urine during a period of 4 hr following a water load of 1 liter was observed in seven male subjects exposed to a normal office environment, a hot/dry (35°C, 3 mm Hg p<sub>H2O</sub>) environment and a comfortable/dry (22°C, 3 mm Hg p<sub>H2O</sub>) environment. The total urine volumes excreted during exposure to the hot/dry environment were considerably reduced compared with the control studies. The comfortable/dry environment had no detectable effect on the total volumes excreted. The physiological significance of the observations, their application to airline crews, and the usefulness of the water load test are discussed. (Author)

## A69-33183

### INFLIGHT SPONTANEOUS PNEUMOTHORAX (A CASE REPORT).

Marinus Flux and J. Robert Dille (Federal Aviation Administration, Civil Aeromedical Research Institute, Oklahoma City, Okla.).

*Aerospace Medicine*, vol. 40, June 1969, p. 660-662. 8 refs.

Discussion of a case which involves a civilian pilot who experienced a 30% collapse of the right lung while exposed to a cockpit pressure equivalent to an altitude of about 21,000 ft. The transient "emphysematous bleb" was near the site of the tube thoracotomy and must have been related to it. In view of its disappearance, the normal pulmonary function, the improved pulmonary symptomatology, the six-month interval, and the normal chamber flight, the pilot was returned to flying duties despite the low ambient pressures to which he is exposed. G.R.



**A69-33184****BETA-ADRENERGIC BLOCKADE - AN AID IN DIAGNOSIS.**

E. B. McKee, J. E. Smith, and G. J. Kidera (United Air Lines, Inc., Medical Dept., Washington, D.C.).

Aerospace Medicine, vol. 40, June 1969, p. 662-667. 31 refs.

Effects of catecholamines on the cardiovascular system. The concept of adrenergic receptors and blockers is discussed, with special emphasis on the use of beta-adrenergic blockade as a method of differentiation between the cardiovascular changes produced by stress-induced catecholamine liberation and those seen in organic disease. Specific reference is made to hypertensive and ECG changes, and a single illustration is presented to point out the major implications. It was concluded that beta-adrenergic blockade would be a useful differential diagnostic tool in those areas where excessive sympathetic input might influence physical signs and objective clinical data. (Author)

**A69-33185****COLOR SIGNALS AND GENERAL AVIATION.**

Harry L. Gibbons and Mark F. Lewis (Federal Aviation Administration, Civil Aeromedical Research Institute, Oklahoma City, Okla.).

Aerospace Medicine, vol. 40, June 1969, p. 668, 669. 6 refs.

Discussion of the extent of use of the color signal light gun for control of aircraft at control towers in the southwest and western U.S. The results of testing of pilots for their knowledge of the meaning of the signal lights are reported. The data suggest that pilots do not retain familiarity with the color signal meaning, apparently due to infrequent use. Although this would support simplification of the color signal code, relaxation of the color vision standards is not supported, since there are other uses of color codes in aviation. (Author)

**A69-33186****PTOSIS AND PROPTOSIS FOLLOWING VALSALVA MANEUVER.**

William M. Chaddock and Bruce A. Ames (USAF, Hospital, Neurosurgical Service, Clark AFB, Philippines).

Aerospace Medicine, vol. 40, June 1969, p. 670, 671.

A case is presented in which the Valsalva maneuver produced the abrupt onset of ptosis and proptosis, presumably caused by rupture of an ethmoidal air cell with extension of air into the orbital cavity. The various etiologies of ptosis and proptosis are discussed. (Author)

**A69-33187****A LURAIN SIMULATOR FOR METABOLIC STUDIES.**

B. D. Newsom (General Dynamics Corp., Convair Div., San Diego, Calif.).

Aerospace Medicine, vol. 40, June 1969, p. 672, 673. 7 refs.

Description of a lurain simulator for a realistic study of lunar locomotion, and results of tests conducted in it. It was found that the lurain simulator concept has considerable potential for metabolic studies, equipment evaluation, and crew training. The period required for oxygen consumption to stabilize in pretest runs on the simulator indicates that learning is required to relax and take advantage of the reduced gravity vector. G. R.

**A69-33278 #****SELECTION OF ASTRONAUT COOLING SYSTEMS FOR EXTRA-VEHICULAR SPACE MISSIONS.**

Douglas C. Howard and Robert G. Syversen (United Aircraft Corp., Hamilton Standard Div., Windsor Locks, Conn.).

American Institute of Aeronautics and Astronautics, Thermophysics Conference, 4th, San Francisco, Calif., June 16-18, 1969, Paper 69-617. 6 p. 5 refs.

Members, \$1.00; nonmembers, \$1.50.

Discussion of control systems that maintain crew member thermal equilibrium and maximize work output. The physiological limitations of gas cooling concepts which necessitate liquid systems for mission requirements of longer duration and higher work rate are amplified. Extensive testing has determined the physiological

parameters which size a liquid cooling system. The transient thermal response of the human system over a wide range of work rates has been related to system performance. Methods for sizing of liquid systems within threshold limitations, thus maintaining equilibrium of the human thermal transport system, are presented. (Author)

**A69-33293 \*#****ADVANCEMENTS OF SPACE SUIT TEMPERATURE CONTROL TECHNOLOGY BY APPLICATION OF MODIFIED HEAT PIPES.**

A. P. Shlosinger (TRW Systems Group, Advanced Technology Section, Redondo Beach, Calif.).

American Institute of Aeronautics and Astronautics, Thermophysics Conference, 4th, San Francisco, Calif., June 16-18, 1969, Paper 69-619. 9 p.

Members, \$1.00; nonmembers, \$1.50.

Contract No. NAS 2-3817.

Evaluation of the use of heat pipes in radiative transfer from the external surface of a space suit for rejection of body heat. The difficulties in accomplishing this approach and its usefulness are discussed. The concept of a predominantly radiation-cooled space suit, applying modified heat-pipe devices for heat transmission and control of the heat rejection rate, is presented. B. H.

**A69-33303 \*#****EVALUATION OF LITHIUM PEROXIDE FOR OXYGEN SUPPLY AND CARBON DIOXIDE CONTROL.**

R. Norman Prince (NASA, Manned Spacecraft Center, Crew Systems Div., Houston, Tex.) and Kenneth J. Dresser (United Aircraft Corp., Hamilton Standard Div., Windsor Locks, Conn.).

American Institute of Aeronautics and Astronautics, Thermophysics Conference, 4th, San Francisco, Calif., June 16-18, 1969, Paper 69-620. 12 p.

Members, \$1.00; nonmembers, \$1.50.

Contract No. NAS 9-8159.

Results of a series of 54 tests conducted to evaluate the feasibility of utilizing lithium peroxide for oxygen supply and carbon dioxide control in advanced extravehicular portable life support systems. The test data generated by these tests show a definite potential for significant weight and volume savings in portable life support systems and space vehicles supporting extravehicular excursions. For example, a lithium peroxide/oxygen system may be up to 11% smaller and 23% lighter than a comparable lithium hydroxide/oxygen system for a 4-hr 2000-Btu/hr (average) mission. This savings becomes even more significant for a vehicle that must support multiple excursions. The program objectives included the generation of system design data, as well as the evaluation of various chemical densities, chemical catalysts, bed temperature, and bed geometry. The most promising chemical form is a low-bulk density lithium peroxide catalyzed by 2% nickel sulfate. The most critical operating parameter was the temperature of the lithium peroxide bed which, under certain test conditions, exceeded 600°F. Although excessive bed temperatures reduce carbon dioxide removal, high temperatures enhance oxygen evolution due to thermal decomposition of the lithium peroxide. (Author)

**A69-33305 #****PARAMETRIC THERMAL CONTROL REQUIREMENTS FOR FUTURE SPACECRAFT.**

R. S. Barker and S. W. Nicol (McDonnell Douglas Corp., McDonnell Douglas Astronautics Co., Western Div., Huntington Beach, Calif.).

American Institute of Aeronautics and Astronautics, Thermophysics Conference, 4th, San Francisco, Calif., June 16-18, 1969, Paper 69-621. 14 p. 8 refs.

Members, \$1.00; nonmembers, \$1.50.

Computed thermal control weight and power requirement data for a group of sample life support system problems formulated for determining relative sensitivities of these thermal control requirements to pertinent independent variables. The independent variables considered include number of occupied cabins, variations in crew activity level, variations in heating and cooling requirements for life support system equipment, closure of the life support

**A69-33364**

system in terms of regeneration of water and oxygen, and number of crew members. Models for thermal control equipment sized for the analyses include cabin exchangers, condensing heat exchangers, cabin wall insulation, liquid cooling and heating loops, and space-radiator loops. For the assumed vehicle geometries, the cabin wall insulation contributed large portions of the total weights. The space-radiator loops contributed significantly to the total weights when availability of space-radiator surface area was limited. It is shown that variations in crew activity level and other variables result in appreciable weight and power variations. Thermal control equipment is shown to comprise significant portions of total life support system weight and power requirements. Sample tradeoff plots are presented for three life support systems. (Author)

**A69-33364**

**PROSPECTIVE CONSIDERATIONS CONCERNING BIO-ACOUSTICS IN RELATION TO BIRD-SCARING TECHNIQUES.**

R. G. Busnel and J. Giban (Institut National de la Recherche Agronomique, Jouy-en-Josas, France).

IN: THE PROBLEMS OF BIRDS AS PESTS; INSTITUTE OF BIOLOGY, SYMPOSIUM, LONDON, ENGLAND, SEPTEMBER 28, 29, 1967, PROCEEDINGS. [A69-33362 17-02]

Edited by R. K. Murton and E. N. Wright. London, Academic Press, Inc. (London), Ltd. (Symposia of the Institute of Biology, No. 17), 1968, p. 17-28. 47 refs.

Summary of research designed to obtain interspecific synthetic signals as effective acoustic bird-scaring techniques. The research includes the study of optical signals; the measurement and analysis of acoustic signals such as awakening, alarm, flight, and food-finding calls; statistical studies of different species of bird hazards; and psychophysiological studies of captive birds. B.H.

**A69-33365**

**RECENT DEVELOPMENTS IN BIRD SCARING ON AIRFIELDS.**

T. Brough (Ministry of Agriculture, Fisheries and Food, Infestation Control Laboratory, Worplesdon, Surrey, England).

IN: THE PROBLEMS OF BIRDS AS PESTS; INSTITUTE OF BIOLOGY, SYMPOSIUM, LONDON, ENGLAND, SEPTEMBER 28, 29, 1967, PROCEEDINGS. [A69-33362 17-02]

Edited by R. K. Murton and E. N. Wright. London, Academic Press, Inc. (London), Ltd. (Symposia of the Institute of Biology, No. 17), 1968, p. 29-38. 6 refs.

Summary of bird-scaring techniques now in use on British airfields. These techniques include the firing of shell crackers from modified Very pistols and broadcast calls to disperse all the major hazard species, with the exception of wood pigeons and oyster catchers. Portable battery-operated equipment carried in a vehicle with loudspeakers mounted on the roof are in use on a number of civil airfields. A large number of military airfields will be equipped with distress call equipment. B.H.

**A69-33368**

**MODIFICATION OF THE HABITAT AS A MEANS OF BIRD CONTROL.**

E. N. Wright (Ministry of Agriculture, Fisheries and Food, Infestation Control Laboratory, Worplesdon, Surrey, England).

IN: THE PROBLEMS OF BIRDS AS PESTS; INSTITUTE OF BIOLOGY, SYMPOSIUM, LONDON, ENGLAND, SEPTEMBER 28, 29, 1967, PROCEEDINGS. [A69-33362 17-02]

Edited by R. K. Murton and E. N. Wright. London, Academic Press, Inc. (London), Ltd. (Symposia of the Institute of Biology, No. 17), 1968, p. 97-105. 8 refs. Research supported by the Ministry of Technology.

Discussion of various forms of environmental control to reduce the bird population of airfields. These means of control include altering the habitat of certain species by draining wet areas or allowing grass to grow longer where it is normally kept short, using selective herbicides and insecticides to reduce the supply of natural foods to be found on airfields, and instituting strict control of edible food waste from aircraft galleys, restaurants, and public enclosures to prevent its becoming a source of food supply for the bird population. B.H.

**A69-33384 #**

**SOME PROBLEMS OF WEIGHTLESSNESS IN SPACE MEDICINE [NEKOTORYE PROBLEMY NEVESOMOSTI V KOSMICHESKOI MEDITSINE].**

P. V. Vasil'ev, I. I. Kas'tian, and I. D. Pestov.

Akademiia Nauk SSSR, Izvestiia, Serii Biologicheskaja, May-June 1969, p. 323-333. 92 refs. In Russian.

Survey of vegetative changes in basic physiological systems during flight in spacecraft. Not of a pathological nature to all appearances, these changes show a development of compensative-adaptational reactions of the organism under unusual environmental conditions. An analysis is made of new data on the blood supply to the thorax area, external respiration, gas exchange, and energy loss during parabolic and orbital flights. Laboratory results confirm the belief that it is possible to increase orthostatic stability and resistance to excessive strain after continuous hypodynamia and immersion, using different physical methods and pharmacological means. V.P.M.

**A69-33385 #**

**MODELING HUMAN MOVEMENTS IN WEIGHTLESSNESS AND IN A WATER ENVIRONMENT FROM THE VIEWPOINT OF A BIOMECHANICAL APPROACH [O MODELIROVANII DVIZHENII CHELOVEKA V NEVESOMOSTI I V VODNOI SREDE S BIOMEKHANICHESKIKH POZITSII].**

N. F. Chekirda, L. V. Chkhaidze, I. A. Kolosov, G. F. Khlebnikov, A. V. Eremin, and V. I. Lebedev.

Akademiia Nauk SSSR, Izvestiia, Serii Biologicheskaja, May-June 1969, p. 334-338. 23 refs. In Russian.

Study of slow and rapid movements of a human hand in a state of weightlessness, in a water environment, and under normal gravity conditions. It is established that for both slow and rapid movements, the inner coordinative structure appears to be more complicated in the water environment than under conditions of weightlessness or normal gravity. However, the performance of slow movements in a water environment and under conditions of weightlessness reveals small differences in terms of muscular efforts. V.P.M.

**A69-33386 #**

**THE EFFECT OF OVERSTRAIN ON THE SENSITIVITY OF ANIMAL ORGANISMS TO CYSTAMINE [VLIANIE PEREGRUZOK NA CHUVSTVITEL'NOST' ORGANIZMA ZHIVOTNYKH K TSISTAMINU].**

V. V. Antipov, M. V. Vasin, B. I. Davydov, and V. S. Shashkov.

Akademiia Nauk SSSR, Izvestiia, Serii Biologicheskaja, May-June 1969, p. 434-438. 22 refs. In Russian.

Study of the effect of overstrain produced by transverse acceleration on the sensitivity of mice to cystamine. It is observed that an increase of the animal's sensitivity occurs under the effect of acceleration following an insignificant rise of the organism's resistance to the action of the preparation. A restoration of the initial reaction of the mice to the administration of cystamine is noted 60 min after the rotation of the animal. The effect of much greater overstrain is the reduction of the animal's sensitivity to cystamine for 15-20 min after centrifugation. The possible mechanism of the observed effect is discussed. V.P.M.

**A69-33525 #**

**HELICOPTER NOISE REDUCTION AND ITS EFFECTS ON OPERATIONS.**

C. R. Cox (Bell Aerospace Corp., Bell Helicopter Co., Fort Worth, Tex.).

American Helicopter Society, Annual National Forum, 25th, Washington, D.C., May 14-16, 1969, Paper 352. 8 p. 13 refs. \$1.00.

Discussion of the factors influencing the reduction of helicopter noise, and assessment of their effects on helicopter design and operation. The unique sound of the helicopter is described and compared with the sound of other forms of transportation. The characteristics of a helicopter's noise are shown to be general functions of its size and the tip speeds of its rotors. Parameters

that affect the noise of small, turbine-powered helicopters are defined, and the modification or the redesign necessary to reduce noise by as much as 15 PNdB is described. G. R.

#### A69-33577 #

CERTAIN COMPENSATORY REACTIONS TO PROLONGED WEIGHTLESSNESS [NIEKTÓRE KOMPENSACYJNE REAKCJE PRZEDŁUŻONEJ NIEWAŻKOŚCI].

Julian Walawski.

*Postępy Astronautyki*, vol. 3, no. 1, 1969, p. 5-11. In Polish.

Description of methods used for investigating the effects of prolonged weightlessness, and outline of adaptive mechanisms of the human organism. The reactions observed in human and animal organisms under prolonged weightlessness are reviewed. Special attention is given to reactions in the blood and its circulation, digestive system, metabolism, nervous system, and the heart. Z. W.

#### A69-33661

A LIST OF EQUIPMENT ENVIRONMENTAL CONDITIONS.

Gustave A. Hormuth (Grumman Aerospace Corp., Measurements Technology Section, Bethpage, N. Y.).

*Journal of Environmental Sciences*, vol. 12, June 1969, p. 24-26. 7 refs.

Tabulation of equipment environmental conditions to assist the environmental engineer in preliminary design considerations for new equipment and in planning a test program for a specimen. The list contains practically all known environmental conditions to which an assembly or component may be subject in storage, transit, or in service. Nearly every condition, not inherent in the specimen, which could affect the performance, structural integrity, or appearance of the specimen is identified as an environmental condition and is included in the list. G. R.

#### A69-33682

LIFE SUPPORT SYSTEMS TECHNOLOGIES FOR SEALED ENVIRONMENTS.

James G. Gaume (McDonnell Douglas Corp., Douglas Aircraft Co., Long Beach, Calif.).

IN: APPLICATIONS OF CRYOGENIC TECHNOLOGY; CRYOGENIC TECHNOLOGY SYMPOSIA OF CRYO-68, CHICAGO, ILL., JUNE 9-12, 1968, LECTURES. [A69-33679 17-23]

Symposia sponsored by the Cryogenic Society of America and the Illinois Institute of Technology.

Edited by R. W. Vance and Harold Weinstock.

Los Angeles, Tinnon-Brown, Inc., 1969, p. 141-157. 8 refs.

Review of the goals and requirements of artificial life support systems for sealed environments. A classification of types of life support systems is presented. The applications of each type to specific missions or vehicles are discussed, and the use of cryogenics in sealed environments is brought into focus wherever applications for this technology can be delineated. B. H.

#### A69-33746 \*

CHANGES IN GROWTH AND BODY COMPOSITION OF MICE EXPOSED TO CHRONIC CENTRIFUGATION.

Lanny C. Keil (NASA, Ames Research Center, Environmental Biology Div., Moffett Field, Calif.).

*Growth*, vol. 33, 1969, p. 83-88. 14 refs.

Mature and weanling mice were centrifuged at 4.7 g for one and two months. After centrifugation, the animals were sacrificed, and their body composition was determined and compared to that of non-centrifuged controls. Centrifuged animals showed a significant reduction in body mass and body fat. Differences in water and protein content between the control and experimental animals may be due to a repression of growth imposed by centrifugation. Increases were seen in the total body calcium of the weanling males, while centrifuged females showed a reduction in calcium after two months of centrifugation. (Author)

#### A69-33748 \*

EFFECT OF TEMPERATURE AND X-IRRADIATION ON PUPAE OF THE FLOUR BEETLE, *TRIBOLIUM CONFUSUM*.

Brenda Buckhold and John V. Slater (California, University, Donnell Laboratory of Medical Physics and Biophysics, Berkeley, Calif.). *Radiation Research*, vol. 37, Mar. 1969, p. 567-576. 11 refs. AEC-supported research; NASA Contract No. R-104(2).

Detailed study of two effects of pupal irradiation in the flour beetle, *Tribolium confusum*. Developmental wing abnormalities were found to be temperature-sensitive, reaching a minimum at 28°C. Also, in terms of wing abnormalities, X-ray sensitivity according to age is variable, having two maxima at 10 and 25 hr postpupation and decreasing to control levels at 39 hr postpupation. The length of the pupal stage is protracted with X-irradiation or with decreased temperature. M. M.

#### A69-33749 \*

SIMIAN EEG ACTIVITY RELATED TO PROBLEM SOLVING DURING A SIMULATED SPACE FLIGHT.

Jan Berkhout, W. Ross Adey, and Eugene Campeau (California, University, Brain Research Institute, Space Biology Laboratory, Los Angeles, Calif.).

*Brain Research*, vol. 13, 1969, p. 140-145. 9 refs.

PHS Grant No. NB-02501; NIH Grant No. FR-3; Contract No. NAS 2-2503.

In order to establish physiological base levels for a 30-day orbital experiment, a monkey (*Macaca nemestrina*) was studied while isolated in a grounded space capsule for thirty days. A four-symbol delayed-matching problem had been selected to monitor the animal's integrity of mentation during orbital flight, and the monkey used in this control run was trained to perform this task prior to isolation in the capsule. Physiological instrumentation for the run included implantation of six depth and four skull EEG electrodes. EEG recordings concurrent with problem solving were made throughout the course of the 30 days. (Author)

#### A69-33750 \*

A COMPARISON OF STIMULUS-BOUND DRINKING AND DRINKING INDUCED BY WATER DEPRIVATION.

Elliot S. Valenstein, Jan W. Kakelewski, and Verne C. Cox (Fels Research Institute, Dept. of Psychophysiology-Neurophysiology, Yellow Springs, Ohio).

*Communications in Behavioral Biology, Part A*, vol. 2, Nov. 1968, p. 227-233. 7 refs.

NIH Grant No. M-4529; Grants No. NSG-437; No. NGL-36-005-001.

Description of significant differences between drinking elicited by hypothalamic stimulation and the drinking induced by thirst (water deprivation). Rats with chronic electrodes implanted in the hypothalamus served as the subjects. "Hypothalamic drinking" does not readily transfer to drinking that requires a different consummatory response; the execution of a motor response may play a more important role in directing "hypothalamic drinking" than it does in the drinking of water deprived animals; relative consumption of a glucose solution and water differ from that of thirsty animals. (Author)

#### A69-33751

RESPIRATORY GAS EXCHANGE IN EXERCISE DURING HELIUM-OXYGEN BREATHING.

T. M. Murphy, W. H. Clark, I. P. B. Buckingham, and W. A. Young (St. Paul's Clinical Investigation Unit, Vancouver, Canada).

*Journal of Applied Physiology*, vol. 26, Mar. 1969, p. 303-307. 12 refs.

Defense Research Board of Canada Grant No. 9310-108.

Six subjects were exercised on a treadmill while breathing air or 21% oxygen in helium through a low-resistance valve. Ventilation, O<sub>2</sub> uptake, and CO<sub>2</sub> output during He-O<sub>2</sub> breathing were compared with values for air breathing at each workload. The ventilations and CO<sub>2</sub> outputs were identical for the two gases. Though the O<sub>2</sub> uptakes were identical at low workloads, the value for He-O<sub>2</sub>

fell abruptly below that for air as the exercise increased. This appears to be due to the development of turbulent flow in the airways at lower ventilations during air breathing than during He-O<sub>2</sub> breathing because of the lower density of the latter gas. Arterialized capillary blood taken at a high workload showed a CO<sub>2</sub> pressure 4 mm lower on He-O<sub>2</sub> than on air, establishing the presence of hyperventilation. The CO<sub>2</sub> production must, therefore, be reduced along with the O<sub>2</sub> consumption although no corresponding fall in ventilation occurs.

(Author)

#### A69-33752 \*

##### THE MOTIVATION UNDERLYING EATING ELICITED BY LATERAL HYPOTHALAMIC STIMULATION.

Elliot S. Valenstein, Verne C. Cox, and Jan W. Kakolewski (Fels Research Institute, Yellow Springs, Ohio).

*Physiology and Behavior*, vol. 3, 1968, p. 969-971. 8 refs.

NIH Grant No. M-4529; Grants No. NSG-437; No. NGL-36-005-001.

Investigation of the nature of the motivation underlying stimulus-bound eating in animals. It was found that animals that eat a specific food in response to lateral hypothalamic stimulation do not readily switch to another familiar food. Furthermore, such animals exhibit a hesitancy to switch to the same food changed in form as when pellets are ground to a powdered meal. In both instances stimulation began to elicit drinking rather than eating of a different or altered food. It is concluded that, in this significant respect, eating elicited by electrical stimulation and hunger are very different.

M.M.

#### A69-33755 \*

##### HEPATIC TYROSINE TRANSAMINASE RHYTHM - INTERACTION OF ENVIRONMENTAL LIGHTING, FOOD CONSUMPTION AND DIETARY PROTEIN CONTENT.

M. J. Zigmond, W. J. Shoemaker, F. Larin, and R. J. Wurtman (Massachusetts Institute of Technology, Dept. of Nutrition and Food Science, Cambridge, Mass.).

*Journal of Nutrition*, vol. 98, May 1969, p. 71-75. 10 refs.

PHS Grants No. AM-11709; No. AM-11237; Grant No. NGR-22-009-272.

Hepatic tyrosine transaminase activity was measured over a 24-hr period in animals maintained under three environmental situations: normal lighting (lights on from 9 a.m. to 9 p.m.) and ad libitum dietary protein; reversed lighting (lights on from 9 p.m. to 9 a.m.) and ad libitum dietary protein; and normal lighting and a nonprotein diet, with protein added at various times during the day. In each case, the increase in tyrosine transaminase activity was not observed until after the initial ingestion of protein. These results support the hypothesis that the daily rhythm in the activity of this enzyme in rat liver is generated by the cyclical ingestion of protein.

(Author)

#### A69-33756 \*

##### VENTROMEDIAL HYPOTHALAMIC LESIONS AND CHANGES IN BODY WEIGHT AND FOOD CONSUMPTION IN MALE AND FEMALE RATS.

Verne C. Cox, Jan W. Kakolewski, and Elliot S. Valenstein (Fels Research Institute, Yellow Springs, Ohio).

*Journal of Comparative and Physiological Psychology*, vol. 67, no. 3, 1969, p. 320-326. 22 refs.

NIH Grant No. M-4529; Grants No. NSG-437; No. NGL-36-005-001.

Ventromedial hypothalamic (VMH) lesions had differential effects in male and female rats. When males and females were matched for either age or weight, lesioned females displayed greater hyperphagia and weight gain than did males. Extensive bilateral VMH damage resulted in diminished rate of weight gain in males, in spite of increased food intake.

(Author)

#### A69-33770

##### ERGONOMY AND AVIATION MEDICINE [ERGONOMIE UND FLUG-MEDIZIN].

H. Schmidtke (München, Technische Hochschule, Institut für Ergonomie, Munich, West Germany).

*Wehrmedizinische Monatsschrift*, vol. 12, Dec. 1968, p. 481-487. In German.

Biotechnological investigation of the supervisory and decision-making activities of human beings in relation to automation. Problems of data collection and control, adaptation, contrast, grouping, coding, and observation during periods of underdemand or over-demand are considered. Experimental results of some radar tests are presented.

B.H.

#### A69-33771

##### FLOW MECHANICS THEORY AND ITS POSSIBLE APPLICATIONS TO MEDICINE [DIE ERKENNTNISSE DER STRÖMUNGSMECHANIK UND IHRE MÖGLICHEN ANWENDUNGEN IN DER MEDIZIN].

E. Truckenbrodt (München, Technische Hochschule, Institut für Strömungsmechanik, Munich, West Germany).

*Wehrmedizinische Monatsschrift*, vol. 12, Dec. 1968, p. 488-493. In German.

Comparison of the human vascular system to a flow system in theoretical flow mechanics. The human system consists of a branching, rather than a simple flow mechanism with elastic, rather than rigid tube walls. In addition, the flow through the vessels is unsteady and pulsed, rather than steady and continuous. The difficulties involved in solving the continuity equation and applying the energy equation under these circumstances are noted. Moreover, the individual vessels show varying energy and pressure losses, depending on their size and wall characteristics. The adaptation of flow-measuring equipment to human organisms on the basis of these characteristics is discussed.

B.H.

#### A69-33772

##### A NEW METHOD OF DETERMINING THE FLOW RATE IN THE ASCENDING AORTA, THE STROKE VOLUME AND THE CARDIAC OUTPUT WITH THE AID OF BALLISTOCARDIOGRAPHY [ÜBER EINE NEUE METHODE DER BESTIMMUNG DER STRÖMUNGSGESCHWINDIGKEIT IN DER AORTA ASCENDENS, DES SCHLAGVOLUMENS UND DER HERZLEISTUNG MIT HILFE DER BALLISTOKARDIOGRAPHIE].

K. Burkhardt and H. W. Kirchhoff (Bundesministerium der Verteidigung, Flugmedizinisches Institut, Fürstfeldbruck, West Germany).

*Wehrmedizinische Monatsschrift*, vol. 12, Dec. 1968, p. 494-498. In German.

Description of a new, bloodless method for determining the stroke and minute volume with the aid of ballistocardiography. A special BKG table constructed for this purpose permits the determination of force components. The mean flow rate in the ascending aorta is calculated on the basis of the Hagen-Poiseuille theory. The new technique permits the determination of cardiac output. Some mean values of stroke volumes arranged by age group are given as examples of this method of calculation and are compared with similar values of stroke volume determined by means of the iodine isotope indicator method.

B.H.

#### A69-33773

##### INVESTIGATION OF IMPEDIMENTS IN THE RESPIRATORY EQUIPMENT OF HIGH-PERFORMANCE AIRCRAFT [UNTERSUCHUNGEN ÜBER DIE WIDERSTÄNDE IN ATEMANLAGEN VON HOCHLEISTUNGSFLUGZEUGEN].

H. A. Gerlach (Bundesministerium der Verteidigung, Flugmedizinisches Institut, Fürstfeldbruck, West Germany).

*Wehrmedizinische Monatsschrift*, vol. 12, Dec. 1968, p. 499-502. In German.

Description of a protective filter developed for incorporation into the inspiration valve of oxygen masks, to overcome respiration

difficulties which originate at this point in the respiration system of high-performance aircraft. The use of this filter, which is still in the developmental stage, results in a reduction of the per minute respiratory volume which can be exchanged with a given pressure amplitude. B.H.

#### A69-33774

RESPIRATORY CHANGES RESULTING FROM BREATHING THROUGH A MASK [VERÄNDERUNGEN DES ATEM-TYPUS BEI MASKENATMUNG].

R. Eife (Bundesministerium der Verteidigung, Flugmedizinisches Institut, Fürstenfeldbruck, West Germany).

Wehrmedizinische Monatsschrift, vol. 12, Dec. 1968, p. 503-506. In German.

Comparison of respiratory difficulties caused by breathing through a mask with changes in respiration resulting from an obstruction caused by a physical respiratory disorder. The respiratory changes in both cases are found to be analogous. The insertion of a protective filter in the mask during the breathing experiment resulted in no significant change in the measured values obtained during the test using an unfiltered mask. B.H.

#### A69-33775

REPORT ON HYPERBARIC EMERGENCY TREATMENT AT THE INSTITUTE FOR AVIATION MEDICINE OF THE LUFTWAFFE [ERFAHRUNGSBERICHT ÜBER DIE HYPERBARE THERAPIE BEI NOTFÄLLEN AM FLUGMEDIZINISCHEN INSTITUT DER LUFTWAFFE].

E. Burchard (Bundesministerium für Verteidigung, Flugmedizinisches Institut, Fürstenfeldbruck, West Germany).

Wehrmedizinische Monatsschrift, vol. 12, Dec. 1968, p. 512-514. In German.

Report on the treatment of eight cases of gangrene and three cases of caisson disease resulting from diving accidents. Despite some initial technical difficulties, application of hyperbaric oxygen was found to be the most effective treatment for even the most severe cases of gas gangrene infection. B.H.

#### A69-33776

BAROTRAUMA DURING HYPERBARIC OXYGENATION [BAROTRAUMA BEI HYPERBARER OXYGENATION].

G. Fröhlich (Bundesministerium der Verteidigung, Flugmedizinisches Institut, Fürstenfeldbruck, West Germany).

Wehrmedizinische Monatsschrift, vol. 12, Dec. 1968, p. 517, 518. In German.

Review of the etiology, diagnosis, therapy, and prognosis of barotraumas suffered during flight descent or entry into a caisson. Various subjective and objective ear trauma symptoms are reviewed, including rupture of the eardrum. Hyperbaric chamber personnel are required to undergo examination to establish normal patency of the ear passages. The use of paracentesis in the case of semi-conscious or unconscious victims of barotrauma is described. The use of paracentesis for patients suffering from common upper respiratory ailments is also cited. B.H.

#### A69-34003

INDIVIDUAL DIFFERENCES AND INTRA-INDIVIDUAL VARIABILITY IN MOTOR PERFORMANCE UNDER CONTINUOUS-PRACTICE CONDITIONS.

George E. Stelmach (California, University, Santa Barbara, Calif.). Human Factors, vol. 11, June 1969, p. 201-205. 16 refs.

Study of the effect of practice on individual differences, intra-individual variability, and remoteness in performance during eight minutes of continuous practice on a large muscle motor task. Individual differences (true score variance) revealed a slight increase

during the practice session, while the intraindividual variability remained relatively unaffected by massed practice. When the improvement in performance was removed by examining the relative variability, both sources of variance increased. The effects of an increasing number of interpolated trials on the intertrial correlations revealed that with increasing amounts of remoteness, the intertrial correlations decreased. (Author)

#### A69-34004

THE EFFECT OF COLOR CODING ON PERFORMANCE OF AN ALPHABETIC FILING TASK.

Stephan A. Konz and Bruce A. Koe (Kansas State University of Agriculture and Applied Science, Manhattan, Kan.).

Human Factors, vol. 11, June 1969, p. 207-212. 11 refs.

Results of an experiment exploring the effect of filing names, typical of a telephone directory, that were color coded on the first letter and on the second letter of the last name. A no-color-code condition was used as a control. Rate of production, number of errors, magnitude of errors, and user preference served as criteria. A total of 22 subjects filed 375 appropriately color-striped IBM cards into a box of IBM cards appropriately coded. The rate of performance and subject preferences indicated that the second-letter code was better than the other two conditions. Based on quantity of errors, the first- and second-letter codes were significantly better than the no-color-code condition. Considering the magnitude of errors, the first-letter code was significantly better than the two other codes. The results of this experiment suggest that a color-coded filing system based on a simple first-letter scheme would significantly reduce the magnitude and quantity of high inconvenience cost errors over the conventional no-color-code system. (Author)

#### A69-34005 #

DESIRABLE DIMENSIONS FOR CONCENTRIC CONTROLS.

James V. Bradley (New Mexico State University, Las Cruces, N. Mex.).

Human Factors, vol. 11, June 1969, p. 213-225.

Results of experiments performed to determine the minimum allowable dimensions of circular, nondetent knobs, mounted on concentric shafts, when frequent inadvertent operation of adjacent coaxial knobs cannot be tolerated. A standard setting was used, and measures were taken of reach time, turning time, and inadvertent touching of adjacent coaxial knobs. Manipulated variables were thickness, diameter, and difference in diameter between the operated knob and the adjacent knobs. It was concluded that if three knobs are to be concentrically ganged and if the middle knob is about 2 in. in diameter, (1) the diameter of the front knob should be at least 1 in. smaller and that of the back knob 1-1/4 in. greater than that of the middle knob, and (2) the front and middle knobs should each be 3/4 in. thick, whereas the back knob may be as thin as 1/4 in. (Author)

#### A69-34006 #

OPTIMUM KNOB CROWDING.

James V. Bradley (New Mexico State University, Las Cruces, N. Mex.).

Human Factors, vol. 11, June 1969, p. 227-237.

Measurement of reach time, turning time, and inadvertent touching of adjacent controls while a standard setting was made with one of several closely spaced knobs. The variables manipulated were spacing between knobs, knob diameter, and knob configuration. Performance improved rapidly with increasing distance between knob edges up to an interperipheral distance of 1 in., after which performance continued to improve but at a much slower rate. For equal amounts of panel space consumed by several closely crowded knobs, 1/2-in.-diam knobs were more nearly error-free than were the larger diameter knobs tested. For equal distances between knob edges, however, performance improved with increasing knob diameter. These results apply only to knobs capable

## A69-34008

of being operated by moderate torque. It was found that the frequency with which a crowding knob is inadvertently touched is strongly affected by the angular position that it occupies with respect to the operated knob, but is practically independent of the presence of other crowding knobs at the same distance from the operated knob.

(Author)

## A69-34008

### EFFECTS OF INTERMITTENT NOISE ON HUMAN TARGET DETECTION.

Harold D. Warner (South Dakota, University, Vermillion, S. Dak.).

Human Factors, vol. 11, June 1969, p. 245-249. 9 refs.

Examination of the effects of intermittent noise on target detection performance. Specifically, the study was designed to test whether the effects of noise presented at a 70% on-off, "neutral" ratio are independent of the noise intensity level. Four levels of noise were used - no noise and 80, 90, and 100 dB. The results revealed that detection time was not significantly affected by the noise level. The total number of errors recorded for each noise condition showed that, in general, as intensity level increased, the total number of errors decreased. These findings are related to the concept of "flexibility of attention."

(Author)

## A69-34009

### THE EFFECTS OF AMBIENT NOISE ON VIGILANCE PERFORMANCE.

Patrick H. McCann.

Human Factors, vol. 11, June 1969, p. 251-256. 13 refs.

Effects of continuous noise vs intermittent noise on subjects performing an audiovisual checking task. Although there was no difference between the effects of the two kinds of noise on total errors, intermittent noise produced a larger number of omission errors than did continuous noise. There were no differences in overall vigilance performance between male and female observers. There was a decrement in performance with time-at-work typically found in other vigilance studies.

(Author)

## A69-34010

### EFFECT OF VIBRATION ON THE OPERATION OF DECIMAL INPUT DEVICES.

Robert D. Dean, Richard J. Farrell, and James D. Hitt (Boeing Co., Seattle, Wash.).

(Human Factors Society, Annual Meeting, 11th, Boston, Mass., Sept. 1967.)

Human Factors, vol. 11, June 1969, p. 257-271. 14 refs.

Determination, through three experimental studies, of the relative effects of mechanical vibration on decimal input performance. Six input panels were used, involving four basic types of controls (push buttons, toggle switches, rotary switches, and thumbwheels). Subjects were engineer/pilots who were given the task of inserting eight-digit decimal numbers. Twelve subjects were used in the first and second studies, 10 in the third. The dependent measures were speed, accuracy, preference, and estimated speed and accuracy. The first study was conducted in an office environment; the second under a control condition and 0.5 RMSg (2 to 30 Hz) random vertical vibration; and the third study under five levels of 2 to 30 Hz random vertical vibration (0.0, 0.2, 0.4, 0.6, and 0.8 RMSg). No single device was best in terms of speed, accuracy, and preference. The overall effect of vibration was to degrade performance.

(Author)

## A69-34011

### THE EFFECT OF LOAD ON MUSCLE OUTPUT.

Charles W. Suggs (North Carolina State University, Raleigh, N.C.).

Human Factors, vol. 11, June 1969, p. 273-279. 5 refs.

Analytic consideration of muscle output resulted in an expression that relates the power output of a muscle to the imposed load. The simplest theory predicted that maximum power output would occur

when the load impedance was equal to the impedance of the muscle system involved. Modification of this theory to accommodate the inverse type of relationship between the force generated and the speed of contraction, in agreement with physiological considerations, predicted the maximum power output at a load impedance (moment of inertia) five to 10 times the impedance of the muscle system involved. Experimental observations over a wide range of loads on a specially constructed inertial dynamometer confirmed the predictions and gave a power curve similar to the one predicted.

(Author)

## A69-34012 #

### OPERATIONAL MEASURES OF AIRCRAFT CARRIER LANDING SYSTEM PERFORMANCE.

Clyde A. Brictson, Anthony P. Ciavarelli, and Joseph W. Wulfack (Dunlap and Associates, Inc., Santa Monica, Calif.).

Human Factors, vol. 11, June 1969, p. 281-289. 5 refs.

Contract No. Nonr-4984(00).

Analysis and interpretation of measures of final landing approach performance during day and night aircraft carrier recovery. Approximately 1800 recoveries were recorded for experienced and inexperienced pilots across four aircraft carriers, six different types of jet aircraft, and various environmental conditions. The salient features of the findings are reviewed and evaluated for their operational implications, with special emphasis on night carrier recovery. Practical applications of the performance data to visual landing aid design and evaluation, pilot and landing signal officer training, and aviation safety are discussed. Empirical landing performance criteria are developed and used to predict the probability of landing success as a function of deviations in final approach performance.

(Author)

## A69-34013

### PSYCHOPHYSICAL STUDIES OF PHYSIOLOGICAL FATIGUE CRITERIA.

Stover H. Snook and Charles H. Irvine (Liberty Mutual Insurance Co., Hopkinton, Mass.).

(Human Factors Society, Annual Meeting, 11th, Boston, Mass., Sept. 1967.)

Human Factors, vol. 11, June 1969, p. 291-299. 35 refs.

Discussion of a laboratory experiment and a field study conducted using psychophysical methods for determining fatigue criteria. Heart rate was measured during these studies as an indication of the physiological level of functioning and was compared with fatigue criteria suggested by other investigators. The consistency of the results in the field study and three replications of the laboratory study demonstrated the reliability of the psychophysical methodology.

(Author)

## A69-34033 #

### INJURY POTENTIAL OF EJECTION SEAT CUSHIONS.

Peter R. Payne (Wyle Laboratories, Payne Div., Rockville, Md.).

Journal of Aircraft, vol. 6, May-June 1969, p. 273-278. 21 refs.

Contract No. AF 33(615)-67-C-1912.

Determination, using the current MIL Specification dynamic model of the human body for the seated, spinal case, of how the dynamic characteristics of an ejection seat cushion influence the incidence of spinal injury during an ejection. The theory is compared with computer studies and shows reasonable agreement. A more sophisticated dynamic model of the human body may be needed before too much reliance can be placed on the conclusions reached in this analysis. However, the general approach seems to be valid, and the conclusions are broadly consistent with operational experience - namely that a thin, soft cushion may slightly attenuate the spinal injury potential of an ejection seat, whereas a thick, stiffer cushion will magnify the injury potential.

(Author)

**A69-34092**

NEW PERSPECTIVES IN ELECTRONIC INFORMATION PROCESSING SUGGESTED FROM OBSERVATIONS OF LIVING SYSTEMS.

J. Ryland Mundie and Gary E. Heller (USAF, Aerospace Medical Research Laboratory, Neurophysiology Branch, Wright-Patterson AFB, Ohio).

IN: '69 NAECON; INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, NATIONAL AEROSPACE ELECTRONICS CONFERENCE, 21ST, DAYTON, OHIO, MAY 19-21, 1969, PROCEEDINGS. [A69-34056 17-09]

New York, Institute of Electrical and Electronics Engineers, Inc., 1969, p. 253-256.

Description of two principles which have been defined from a study of the way animals hear. Both principles have been realized to some extent in hardware models in order to demonstrate and evaluate them. The results so far obtained show that these principles are useful and unique. Since the ear is an analyzer of analog signals, both principles apply to analog signal processing. M.M.

**A69-34094 #**

A MODEL FOR THE CLASSIFICATION OF VISUAL IMAGES.

Oliver Tallman (USAF, Washington, D.C.).

IN: '69 NAECON; INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, NATIONAL AEROSPACE ELECTRONICS CONFERENCE, 21ST, DAYTON, OHIO, MAY 19-21, 1969, PROCEEDINGS. [A69-34056 17-09]

New York, Institute of Electrical and Electronics Engineers, Inc., 1969, p. 261-270, 10 refs.

Consideration of a subproblem of the pattern-recognition process, called the classification of visual images. The problem is approached not by constructing a device which classifies visual images, but by modeling the eye of the beholder. A simple biological model and its corresponding engineering model are described, and some properties of the engineering model are reviewed. The results of a simulation experiment are presented. M.M.

**A69-34095**

HELIUM SPEECH PROCESSING.

John L. Stewart (Santa Rita Technology, Inc., Menlo Park, Calif.).

IN: '69 NAECON; INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, NATIONAL AEROSPACE ELECTRONICS CONFERENCE, 21ST, DAYTON, OHIO, MAY 19-21, 1969, PROCEEDINGS. [A69-34056 17-09]

New York, Institute of Electrical and Electronics Engineers, Inc., 1969, p. 271-274, 10 refs.

USAF-sponsored research.

Description of a simple helium speech processor suitable for aerospace applications. Various concepts as to the nature of helium speech distortion are presented. It is noted that, although satisfactory for some applications, conventional processors (as have been built to date, including the one described), leave room for improvement. It is believed that achieving better results, especially for more extreme environments of gas pressures and mixtures, will require a markedly different design approach. M.M.

**A69-34103**

A PROPOSED LOW COST PROXIMITY WARNING DEVICE FOR AIRCRAFT.

L. C. Drew, W. R. L. Thomas, A. G. Atward, C. Park, and H. King (Radio Corporation of America, Defense Electronic Products, Aerospace Systems Div., Burlington, Mass.).

IN: '69 NAECON; INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, NATIONAL AEROSPACE ELECTRONICS CONFERENCE, 21ST, DAYTON, OHIO, MAY 19-21, 1969, PROCEEDINGS. [A69-34056 17-09]

New York, Institute of Electrical and Electronics Engineers, Inc., 1969, p. 325-331.

Outline of a feasible pilot proximity warning instrument. It is noted that the optical system, detectors, signal processors, and display units could all be manufactured at low cost, and that the

device could be fitted to most aircraft with a minimum of modification. It is believed that such a system would be of considerable value in preventing collisions, and very much welcomed by all pilots.

M.M.

**A69-34171 \***

MODIFICATION OF THE CORTICAL CLICK-EVOKED RESPONSE DURING EYE MOVEMENT IN CATS.

John S. Ebersole and Robert Galambos (Yale University, Dept. of Psychology, New Haven, Conn.).

Electroencephalography and Clinical Neurophysiology, vol. 26, 1969, p. 273-279, 12 refs.

NIH Grant No. 5 T1 GM 1106-04; NSF Grant No. GY-2758; Grant No. NsG-374.

Optokinetic nystagmus was induced in four cats by moving vertical black and white stripes before their eyes. The response to click stimuli triggered by the eye movements was recorded from electrodes chronically implanted along the classical auditory pathway. Computer-averaged click-evoked responses from the cortex declined linearly in amplitude as a function of eye movement velocity; no such relationship existed at subcortical auditory nuclei. Within 15 msec after the onset of eye movement, the amplitude of cortical evoked responses was substantially reduced. At 100 msec when the velocity of movement was beginning to decline, the depression was at its maximum (50% of control amplitude). Despite their disparate time courses, eye movements and depression of the cortical auditory evoked response are clearly interrelated. Some properties of a central mechanism that could be responsible for this are described. (Author)

**A69-34172 \***

REGISTRATION OF INTRAVASCULAR PRESSURE AND SOUND BY A FIBEROPTIC CATHETER.

Alberto Ramirez, William B. Hood, Jr., Michael Polanyi, Richard Wagner, Nicholas A. Yankopoulos, and Walter H. Abelmann (Boston City Hospital, Second and Fourth Medical Services, Thorndike Memorial Laboratory; Harvard University, Harvard Medical School, Dept. of Medicine, Boston; American Optical Co., Research Div., Framingham, Mass.).

(Association for the Advancement of Medical Instrumentation, Annual Meeting, 3rd, Houston, Tex., July 18, 1968.)

Journal of Applied Physiology, vol. 26, May 1969, p. 679-683, 14 refs.

NIH Grants No. HE-10539; No. HE-5244; No. FR-76; Grant No. NGR-22-007-019.

Measurement, using a fiberoptic pressure catheter, of intravascular pressures in seven anesthetized dogs and in five patients. This device employs light transmitted via fiberoptic bundles incorporated into a cardiac catheter. The catheter has a frequency response which is flat to 1600 Hz, the limit of the hydraulic pressure generator used in testing. It displays stable gain and linearity from -50 to +250 mm Hg, is thermostable (0.1 mm Hg base-line shift per °C), and has a noise level equivalent to less than 0.1 mm Hg. In five patients studied the fiberoptic catheter tracings were free of unwanted artifacts and thus superior to those obtained from a cardiac catheter and external transducer system. This was also true in animal experiments with drug-induced augmentation of ventricular contraction, tachycardia, bradycardia, hypertension, and hypotension. The characteristics of this system permit accurate recording of high-frequency events, including heart sounds and pressure derivatives. (Author)

**A69-34176 \***

EVIDENCE FOR THE PRESENCE OF LIGNIN IN MOSS GAMETOPHYTES.

S. M. Siegel (Hawaii, University, Dept. of Botany, Honolulu, Hawaii).

American Journal of Botany, vol. 56, Feb. 1969, p. 175-179, 25 refs.

Grant No. NGR-12-001-053.

Detection of lignin as a constituent of the gametophyte axes in the giant New Zealand mosses *Dawsonia* sp. and *Dendroligotrichum* sp. Isolated products comprised 6-10% of the dry weight of gametophyte axes and contained 61-62% C, 6.4-6.8% H, and 5.1-7.9% OCH<sub>3</sub>. Characteristic color reaction and UV spectra were observed, and alkaline introbenzene oxidation yielded perhaps 14 to 18% of mixed aldehydes as their 2,4-dinitrophenylhydrazones. The presence of substantial lignin in these exceptionally tall upright moss gametophytes contrasts strikingly with north temperate species such as *Polytrichum*, *Funaria*, *Bryum* and others, and lends support to the hypothesis that lignification is a mechanically and/or gravitationally regulated process. M.M.

#### A69-34312

##### LASER DAMAGE THRESHOLDS FOR OCULAR TISSUES.

Norman A. Peppers and Ann H. Hammond (Stanford Research Institute, Electromagnetic Techniques Laboratory, Menlo Park, Calif.).

*American Industrial Hygiene Association Journal*, vol. 30, May-June 1969, p. 218-225. 27 refs.

Consideration of damage mechanisms, theoretical models, damage criteria, and experimental problems in determining damage thresholds to ocular tissue from laser radiation. A comprehensive summary of damage thresholds is presented and is compared with theoretical curves and published recommended safe working levels. B.H.

#### A69-34324

##### SOUND DURATION AND ITS EFFECT ON JUDGED ANNOYANCE.

J. W. Little and J. E. Mabry (Boeing Co., Seattle, Wash.). *Journal of Sound and Vibration*, vol. 9, Mar. 1969, p. 247-262. 12 refs.

If two noises are identical in every respect except that the first is of greater duration than the second, it is expected that the first noise would be judged more annoying than the second. The primary aims of these studies are to test that expectation and to quantify the relationship between duration and judged annoyance. Caution should be exercised in applying the results, since only two spectra, random noise and a fan jet ground run-up, were examined. Depending on the laboratory conditions under which the annoyance judgments were made, the penalty for doubling of duration ranges from 0.6 to 3.1 dB for durations of 1 to 34 sec. The median penalty was 2.0 dB for doubling of duration. When attempting to quantify the relationship between duration and noise it can be concluded that one should not average across instructions, as the two kinds of instructions do not produce similar relationships between duration and annoyance. (Author)

#### A69-34325

##### JUDGMENTS OF THE ACCEPTABILITY OF AIRCRAFT NOISE IN THE PRESENCE OF SPEECH.

C. E. Williams, M. Klatt (Bolt, Beranek and Newman, Inc., Cambridge, Mass.), and K. N. Stevens (Bolt, Beranek and Newman, Inc.; Massachusetts Institute of Technology, Cambridge, Mass.). *Journal of Sound and Vibration*, vol. 9, Mar. 1969, p. 263-275. 11 refs.

Contract No. FA-66-WA-1566.

Study of the acceptability of aircraft noise on the basis of a test in which listeners were asked to rate various aircraft flyovers. Judgments were obtained of noise presented without speech and of noise presented simultaneously with speech. In those situations where speech was present, the listeners, after making their acceptability judgments for a given flyover, were asked questions regarding the content of the speech. Judgments were compared with the maximum noise level occurring during the flyover. Correlations between listener ratings and three physical measures were essentially the same, indicating that any one of the measures is equally effective for predicting listener acceptability of aircraft noise. G.R.

#### A69-34478

##### MATHEMATICAL MODELING OF HUMAN PERFORMANCE RELIABILITY.

Thaddeus L. Regulinski (USAF, Air University, Institute of Technology, Wright-Patterson AFB, Ohio) and William B. Askren (USAF, Human Resources Laboratory, Wright-Patterson AFB, Ohio). IN: ANNUAL SYMPOSIUM ON RELIABILITY, CHICAGO, ILL., JANUARY 21-23, 1969, PROCEEDINGS. [A69-34476 18-15] Symposium sponsored by the Institute of Electrical and Electronics Engineers, the Institute of Environmental Sciences, the American Society for Nondestructive Testing, and the American Society for Quality Control. New York, Institute of Electrical and Electronics Engineers, Inc. (Annals of Assurance Sciences. Volume 2, No. 1), 1969, p. 5-11. 16 refs.

Preliminary results of research into the feasibility of mathematically modeling human performance reliability. The study addressed itself to time continuous tasks with the derivation of a general mathematical model of the probability of errorless performance which is equated to human performance reliability. The application of this lowest concentration in some individuals. The results of the toxicological study are reported and discussed. V.P.M.

#### A69-34539 \*

##### RESPONSES OF CLADONIA RANGIFERINA TO EXPERIMENTAL STRESS FACTORS.

S. M. Siegel and Olive Daly (Union Carbide Corp., Research Institute, Tarrytown, N.Y.).

*Botanical Gazette*, vol. 129, Dec. 1968, p. 339-345. 20 refs. Contract No. NASw-767; Grant No. NGR-12-001-042.

Study of responses to experimental stress of *Cladonia rangiferina* by comparing respiration and staining reactions as indicators of injury. The stress factors employed were heat and cold shock, ultraviolet radiation,  $\gamma$ -radiation, D<sub>2</sub>O, salt solutions, and constant low temperature. Hematoxylin and eosin Y proved particularly useful, staining injured but not untreated tissues. Generally, treatments that markedly reduced respiration rendered tissues permeable to the dyes, but the two criteria together may offer a more consistent index of tissue damage. Among the more striking tolerances shown by *Cladonia* were: persistence of low-level respiration after immersion in boiling water, resistance to 500 krad of <sup>60</sup>Co  $\gamma$ -radiation, restoration of near-normal respiration after replacement of H<sub>2</sub>O by D<sub>2</sub>O, and persistence of respiration at -40°C in saturated LiCl. (Author)

#### A69-34540 \*

##### "SUN LEAVES" AND "SHADE LEAVES" - DIFFERENCES IN CONVECTIVE HEAT DISSIPATION.

Steven Vogel (Duke University, Dept. of Zoology, Durham, N.C.). *Ecology*, vol. 49, Autumn 1968. 2 p. 7 refs.

NIH Grant No. R-01-GM-1222; Grant No. NGR-34-001-005.

Results of temperature measurements of radiantly heated sun and shade leaves of white oak (*Quercus alba* L.) in a low-speed wind tunnel. In either still air or a gentle updraft the difference between ambient and leaf temperature is about 20% less for the sun leaves than for the shade leaves. Consequently the former are more effective heat dissipaters. (Author)

#### A69-34543 \*

##### ASSAY OF UREASE ACTIVITY USING <sup>14</sup>C-UREA IN STORED, GEOLOGICALLY PRESERVED, AND IN IRRADIATED SOILS.

J. J. Skujins and A. D. McLaren (California, University, Dept. of Soils and Plant Nutrition, Berkeley, Calif.).

*Soil Biology and Biochemistry*, vol. 1, 1969, p. 89-99. 35 refs. Grants No. NSG-704; No. NGL-05-003-079.

Results of urease-activity tests made on soils of adverse and diverse climatic and geographic areas, and on soils stored for various lengths of time. Unlike high salinity soils, urease activity



was detected in an alkali soil and an acid soil, with highest activity being usually found in neutral soils. While high-energy electron-beam irradiation increased urease activity in some soils, the effect on other soils was decreased activity. It is stated that an intracellular urease component becomes more accessible to the substrate upon death of the microorganisms. A new method for urease activity determination in soils was devised, based on the detection of  $^{14}\text{CO}_2$  release from  $^{14}\text{C}$ -urea-amended soils. V.P.M.

#### A69-34669 \*#

COMPUTER SIMULATION OF PHYSIOLOGICAL PROCESSES.  
Vincent C. Rideout (Wisconsin, University, Madison, Wis.).  
IN: COMPUTATIONAL APPROACHES IN APPLIED MECHANICS;  
AMERICAN SOCIETY OF MECHANICAL ENGINEERS, COMPUTER  
CONFERENCE, ILLINOIS INSTITUTE OF TECHNOLOGY, CHICAGO,  
ILL., JUNE 19, 20, 1969, PROCEEDINGS. [A69-34657 18-08]  
New York, American Society of Mechanical Engineers, 1969, p. 230-  
241. 24 refs.  
Grant No. NGR-50-002-083.

Discussion of procedures for physiological system modeling. The computer simulation of the aorta is described as an example. The difficulties of the method are noted, and it is shown that the selection of subsystems presents the major problem in system identification. It is concluded that system modeling can be applied to physiological systems by using computer techniques. Further prospects of the method are reviewed, noting that parameter estimation procedures based on dynamic responses of an individual may in future be used for clinical purposes, especially when cheaper and more compact hybrid computers are available. P.G.

#### A69-34692

IS THERE A COMMON GEOTROPIC DEPENDENCY IN ORGANISMS?  
W. Briegleb (Deutsche Versuchsanstalt für Luft- und Raumfahrt,  
Institut für Flugmedizin, Bad Godesberg, West Germany).  
IN: INTERNATIONAL ASTRONAUTICAL FEDERATION, INTER-  
NATIONAL ASTRONAUTICAL CONGRESS, 18TH, BELGRADE,  
YUGOSLAVIA, SEPTEMBER 24-30, 1967, PROCEEDINGS.  
VOLUME 4 - LIFE IN SPACECRAFT.  
Edited by Michał Łunc.  
Oxford, Pergamon Press, Ltd.; Warsaw, Państwowe Wydawnictwo  
Naukowe, 1968, p. 87-90. 13 refs.  
(DVL-874)

Results of zero-gravity experiments with algae and other cultures to determine whether terrestrial organisms are gravity-dependent. It is concluded that the general dependence of such organisms on gravity is very indirect, and that life processes in general seem to be gravity-independent. B.H.

#### A69-34727

EXPERIMENTAL VERIFICATION OF PERMISSIBLE RADIATION  
DOSES DURING PROLONGED SPACE FLIGHTS - A "CHRONIC  
EXPERIMENT" ON DOGS.  
Iu. G. Grigor'ev, B. A. Markelov, V. I. Popov, A. A. Akhunov,  
A. V. Iliukhin, T. P. Tsessarskaia, A. V. Sedov, and V. A.  
Korsakov.  
(Kosmicheskaya Biologiya i Meditsina, vol. 2, Sept.-Oct. 1968,  
p. 3-8.)  
Environmental Space Sciences, vol. 2, Sept.-Oct. 1968, p. 335-339.  
Translation.  
[For abstract see issue 05, page 708, Accession no. A69-16508]

#### A69-34728

PATHOMORPHOLOGICAL FEATURES OF RADIATION SICKNESS IN  
ANIMALS IRRADIATED WITH HIGH-ENERGY PROTONS.

V. V. Shikhodyrov and B. I. Lebedev.  
(Kosmicheskaya Biologiya i Meditsina, vol. 2, Sept.-Oct. 1968,  
p. 8-11.)  
Environmental Space Sciences, vol. 2, Sept.-Oct. 1968, p. 340-  
342. 6 refs. Translation.  
[For abstract see issue 05, page 708, Accession no. A69-16509]

#### A69-34729

ON THE PROBLEM OF CHANGES IN EFFECT OF RADIATION ON  
PLANTS SUBJECTED TO COSMIC FLIGHT FACTORS.  
D. F. Gertsuskii, I. V. Nikitina, L. V. Alekseenko, and I. S.  
Skukina.  
(Kosmicheskaya Biologiya i Meditsina, vol. 2, Sept.-Oct. 1968,  
p. 12-14.)  
Environmental Space Sciences, vol. 2, Sept.-Oct. 1968, p. 343,  
344. 10 refs. Translation.  
[For abstract see issue 05, page 708, Accession no. A69-16510]

#### A69-34730

RADIOSENSITIVITY OF POTATOES TO GAMMA AND PROTON  
IRRADIATION APPLIED TO WHOLE TUBERS AND ISOLATED  
EYES BEFORE PLANTING.  
Iu. I. Shaidorov, D. F. Gertsuskii, I. S. Skukina, L. V. Alekssenko,  
and I. V. Nikitina.  
(Kosmicheskaya Biologiya i Meditsina, vol. 2, Sept.-Oct. 1968,  
p. 14-19.)  
Environmental Space Sciences, vol. 2, Sept.-Oct. 1968, p. 345-  
348. 20 refs. Translation.  
[For abstract see issue 05, page 709, Accession no. A69-16511]

#### A69-34731

EFFECTS OF HIGH OXYGEN CONCENTRATIONS ON ANIMALS.  
N. A. Agadzhanian, M. S. Gaevskaia, V. G. Galaktionov, V. M.  
Zemskov, I. R. Kalinichenko, G. D. Kniazeva, M. F. Kolesnikov,  
I. V. Konstantinova, K. A. Lebedev, A. V. Sergienko, L. M. Slez,  
and V. P. Smirnov.  
(Kosmicheskaya Biologiya i Meditsina, vol. 2, Sept.-Oct. 1968,  
p. 19-24.)  
Environmental Space Sciences, vol. 2, Sept.-Oct. 1968, p. 349-  
352. 6 refs. Translation.  
[For abstract see issue 05, page 709, Accession no. A69-16512]

#### A69-34732

HISTOLOGICAL EXAMINATION OF THE INTERNAL ORGANS OF  
MICE AFTER TWENTY DAYS IN A HYPEROXIC ATMOSPHERE.  
V. V. Portugalov, G. N. Durnova, A. S. Kaplanskii, and F. V.  
Babchinskii.  
(Kosmicheskaya Biologiya i Meditsina, vol. 2, Sept.-Oct. 1968,  
p. 24-27.)  
Environmental Space Sciences, vol. 2, Sept.-Oct. 1968, p. 353-  
355. 13 refs. Translation.  
[For abstract see issue 05, page 709, Accession no. A69-16513]

#### A69-34733

ELECTRON MICROSCOPIC CHANGES IN THE LUNGS OF RATS  
AFTER REPEATED EXPOSURE TO PURE OXYGEN.  
V. N. Vinogradov and F. V. Babchinskii.  
(Kosmicheskaya Biologiya i Meditsina, vol. 2, Sept.-Oct. 1968,  
p. 27-30.)  
Environmental Space Sciences, vol. 2, Sept.-Oct. 1968, p. 356-  
358. 14 refs. Translation.  
[For abstract see issue 05, page 709, Accession no. A69-16514]

## A69-34734

### A69-34734

THE EFFECT ON THE EVOKED POTENTIAL OF THE CORTICAL OPTIC AND SOME SUBCORTICAL ZONES OF HIGH OXYGEN CONCENTRATIONS AT NORMAL PRESSURE.

L. V. Kaliuzhnyi.

(*Kosmicheskaya Biologiya i Meditsina*, vol. 2, Sept.-Oct. 1968, p. 31-38.)

*Environmental Space Sciences*, vol. 2, Sept.-Oct. 1968, p. 359-364. 14 refs. Translation.

[For abstract see issue 05, page 709, Accession no. A69-16515]

### A69-34735

CHANGES IN THE INTESTINAL MICROFLORA OF PROTEIN-STARVED RATS.

N. N. Liz'ko, V. M. Shilov, V. I. Fofanov, and N. S. Kliushkina. (*Kosmicheskaya Biologiya i Meditsina*, vol. 2, Sept.-Oct. 1968, p. 38-41.)

*Environmental Space Sciences*, vol. 2, Sept.-Oct. 1968, p. 365-367. 18 refs. Translation.

[For abstract see issue 05, page 709, Accession no. A69-16516]

### A69-34736

ROLE OF THYROID GLAND IN CHANGES OF RESISTANCE AND MYOGLOBIN CONTENT OF SKELETAL MUSCLES IN "LOWLAND" AND ALP-ADAPTED WHITE RATS.

A. B. Botombekova.

(*Kosmicheskaya Biologiya i Meditsina*, vol. 2, Sept.-Oct. 1968, p. 42-45.)

*Environmental Space Sciences*, vol. 2, Sept.-Oct. 1968, p. 368-370. 10 refs. Translation.

[For abstract see issue 05, page 709, Accession no. A69-16517]

### A69-34737

DYNAMICS OF FORMANTS IN THE SPECTRUM OF SPEECH AS OBJECTIVE INDICATOR OF DIFFERENCES BETWEEN POSITIVE AND NEGATIVE EMOTIONS.

A. G. Tishchenko.

(*Kosmicheskaya Biologiya i Meditsina*, vol. 2, Sept.-Oct. 1968, p. 46-51.)

*Environmental Space Sciences*, vol. 2, Sept.-Oct. 1968, p. 371-375. 17 refs. Translation.

[For abstract see issue 05, page 709, Accession no. A69-16518]

### A69-34738

CHANGES OF CARDIAC ACTIVITY DURING PROTRACTED HYPOKINESIA (BASED ON VECTOR ANALYSIS DATA).

B. A. Korolev.

(*Kosmicheskaya Biologiya i Meditsina*, vol. 2, Sept.-Oct. 1968, p. 52-55.)

*Environmental Space Sciences*, vol. 2, Sept.-Oct. 1968, p. 376-378. 12 refs. Translation.

[For abstract see issue 05, page 710, Accession no. A69-16519]

### A69-34739

EFFECT OF PROTRACTED HYPOKINESIA ON BRAIN BIOELECTRIC POTENTIALS OF HEALTHY PERSONS.

B. N. Petukhov and Yu. N. Purakhin.

(*Kosmicheskaya Biologiya i Meditsina*, vol. 2, Sept.-Oct. 1968, p. 56-61.)

*Environmental Space Sciences*, vol. 2, Sept.-Oct. 1968, p. 379-383. 16 refs. Translation.

[For abstract see issue 05, page 710, Accession no. A69-16520]

### A69-34740

USE OF DOSED CORIOLIS ACCELERATIONS IN VESTIBULOMETRY. R. R. Galle and L. N. Gavrilova.

(*Kosmicheskaya Biologiya i Meditsina*, vol. 2, Sept.-Oct. 1968, p. 61-66.)

*Environmental Space Sciences*, vol. 2, Sept.-Oct. 1968, p. 384-388. 29 refs. Translation.

[For abstract see issue 05, page 710, Accession no. A69-16521]

### A69-34741

MECHANICS OF THE RESPIRATORY ACT DURING PROLONGED EXPOSURE TO ACCELERATIONS (RADIOLOGICAL STUDY).

K. I. Murakhovskii.

(*Kosmicheskaya Biologiya i Meditsina*, vol. 2, Sept.-Oct. 1968, p. 67-73.)

*Environmental Space Sciences*, vol. 2, Sept.-Oct. 1968, p. 389-392. 14 refs. Translation.

[For abstract see issue 05, page 710, Accession no. A69-16522]

### A69-34742

USE OF HIGH TEMPERATURES AS PROVOCATIVE TESTS.

A. N. Azhaev, V. D. Vasiuta, N. A. Lapshina, and T. A. Orlova.

(*Kosmicheskaya Biologiya i Meditsina*, vol. 2, Sept.-Oct. 1968, p. 73-77.)

*Environmental Space Sciences*, vol. 2, Sept.-Oct. 1968, p. 393-395. Translation.

[For abstract see issue 05, page 710, Accession no. A69-16523]

### A69-34743

AUTOMATIC PROCESSING OF ELECTROCARDIOGRAMS RECORDED DURING COSMIC FLIGHT.

V. A. Krylov, A. S. Demidov, and A. D. Egorov.

(*Kosmicheskaya Biologiya i Meditsina*, vol. 2, Sept.-Oct. 1968, p. 77-82.)

*Environmental Space Sciences*, vol. 2, Sept.-Oct. 1968, p. 396-399. 9 refs. Translation.

[For abstract see issue 05, page 715, Accession no. A69-16524]

### A69-34744

BIOCHEMICAL INDICES OF THE RESPONSE OF FLIERS TO COMPLEX CONDITIONS OF FLIGHT.

I. G. Dlusskaia, T. A. Orlova, V. A. Ponomarenko, and I. S. Balakhovskii.

(*Kosmicheskaya Biologiya i Meditsina*, vol. 2, Sept.-Oct. 1968, p. 83-87.)

*Environmental Space Sciences*, vol. 2, Sept.-Oct. 1968, p. 400-403. 11 refs. Translation.

[For abstract see issue 05, page 710, Accession no. A69-16525]

### A69-34821

ULTRASONIC DETECTION OF GAS BUBBLES IN BLOOD.

D. M. J. P. Manley (Norcol, Ltd., Hartley Wintney, Hants., England).

*Ultrasonics*, vol. 7, Apr. 1969, p. 102-105.

Description of several ultrasonic techniques for the detection of gas bubbles in blood. The discussion is confined to techniques that have been applied to certain medical problems, but may be applicable to liquids other than blood. A device consisting of a bubble chamber attached to a circulating liquid system is shown to detect large and small bubbles. Bubbles were most noticeable when the ultrasonic signal was at the first or third harmonic of the receiver crystal (43 and 130 kHz).

F. R. L.

**A69-35061 #**

## CLINICAL TOXICOLOGIC STUDIES ON FREON R FE 1301.

C. H. Hine, H. W. Elliott, J. W. Kaufman, and S. Leung (Hine Laboratories, Inc.; California, University, School of Medicine, Dept. of Pharmacology, Toxicological Group, San Francisco, Calif.).

IN: SPACE, TECHNOLOGY, AND SOCIETY; CANAVERAL COUNCIL OF TECHNICAL SOCIETIES, SPACE CONGRESS, 6TH, COCOA BEACH, FLA., MARCH 17-19, 1969, PROCEEDINGS. VOLUME 2. [A69-35055 18-34]

Edited by L. E. Jones, III.

Cape Canaveral, Fla., Canaveral Council of Technical Societies, 1969, p. 8-1 to 8-4.

Research sponsored by the Boeing Co. and Du Pont de Nemours and Co.

Investigation of the toxic effects of Freon FE 1301. After conducting appropriate animal tests to ascertain safe levels, experiments were carried out on human subjects at differing concentrations of FE 1301. Assessment of judgment, alertness, and neuromuscular skill indicated minimal, yet discernible, effects at the and therapeutic care, but should be extended to the prevention and development of the facilities of a specific health organization.

M. M.

**A69-35085 #**

## THE STRUCTURE OF COMPLEX PHYSICAL PERFORMANCE.

Edward W. Karnes (Martin Marietta Corp., Denver, Colo.), Donald Hilsendager, and Thomas Spiritoso (Temple University, Philadelphia, Pa.).

IN: SPACE, TECHNOLOGY, AND SOCIETY; CANAVERAL COUNCIL OF TECHNICAL SOCIETIES, SPACE CONGRESS, 6TH, COCOA BEACH, FLA., MARCH 17-19, 1969, PROCEEDINGS. VOLUME 1. [A69-35070 18-34]

Edited by L. E. Jones, III.

Cape Canaveral, Fla., Canaveral Council of Technical Societies, 1969, p. 6-1 to 6-8. 8 refs.

Discussion of the use of the statistical technique of factor analysis as a research tool in assessing complex physical performance of man, and its potential application to simulation research programs. A preliminary factor-analytic investigation of complex perceptual-motor performance is presented. In the investigation, 12 complex physical proficiency tests were administered, including 24 simple perceptual-motor measures of speed, flexibility, balance, and strength. Results indicate that factor-analytic techniques are valuable in identifying the differential components or abilities underlying performance in complex motor skills.

F. R. L.

**A69-35165 #**

## GROUND EXPERIMENT AND PROLONGED SPACE FLIGHTS [NAZEMNYI EKSPERIMENT I DLITEL'NYE KOSMICHESKIE POLETY].

A. I. Burnazian (Ministerstvo Zdravookhraneniia SSSR, Moscow, USSR).

Akademiia Nauk SSSR, *Vestnik*, vol. 39, May 1969, p. 82-90. In Russian.

Discussion of the significance of medical and biological laboratory experiments on the ground in the development of life-support systems and biologically suitable environments for extended manned space flights. A biological experiment, started in November 1967, in which a team of three men was confined for one year in a simulation chamber under diet and physical conditions of a space flight, is discussed specifically. Further studies in this field are outlined.

V. Z.

**A69-35172 \***

## COMPARTMENTATION OF GLUTAMIC ACID METABOLISM IN BRAIN SLICES.

S. Berl, D. D. Clarke (Columbia University, College of Physicians and Surgeons, Dept. of Neurology; Fordham University, Dept. of Chemistry, New York, N.Y.), and W. J. Nicklas.

*Journal of Neurochemistry*, vol. 15, 1968, p. 131-140. 30 refs.

Research supported by the United Cerebral Palsy Research and Educational Foundation; PHS Grants No. NB-04064-05; No. GM-12882; Grant No. NGT-33-012-002.

Demonstration of the compartmentation of the glutamate metabolism in the brain cortex in vitro using brain tissue slices. In the experiments, [U-<sup>14</sup>C]aspartate and [U-<sup>14</sup>C]glutamate were used as tracer substrates. Preparation and maintenance of the slices at 0° resulted in reversible inhibition of glutamine synthesis. Preincubation at 37° for 10 min or preparation of the slices at room temperature partially overcame this inhibition. Transfer to a fresh medium after preincubation had an added stimulatory effect on glutamine synthesis. Incubation in a high-K<sup>+</sup> medium altered the relative specific activity of glutamine. It is concluded that the data are in keeping with the postulate of the existence of at least two different pools of citric acid cycle intermediates in the cerebral cortex.

P. G.

**A69-35291 \***

## EFFECT OF SALTS AND ORGANIC SOLVENTS ON THE ACTIVITY OF HALOBACTERIUM CUTIRUBRUM CATALASE.

Janos K. Lanyi and Joann Stevenson (NASA, Ames Research Center, Exobiology Div., Moffett Field, Calif.).

*Journal of Bacteriology*, vol. 98, May 1969, p. 611-616. 11 refs.

Observation that catalase in extracts of the extreme halophile *Halobacterium cutirubrum* exhibits up to threefold stimulation by 0.5 to 1.5 M monovalent salts and by 0.1 M divalent salts, while inhibition of enzyme activity occurs at higher concentrations. The inhibitory effect, and to some extent the stimulation, is salt-specific; the effectiveness of a salt in inhibiting enzyme activity depends on both cation and anion. Aqueous solutions of ethylene glycol, glycerol, and dimethyl sulfoxide containing no ions influence enzyme activity in the same manner as do salts.

F. R. L.

**A69-35301 #**

## MENTAL HYGIENE IN RELATION TO THE WORK OF AN AIRCRAFT PILOT AND THE FLIGHT SURGEON'S TASKS AS AN ELEMENT OF PREVENTIVE MEDICINE [L'IGIENE MENTALE IN RAPPORTO AL LAVORO DEL PILOTA D'AVIAZIONE E COMPITI DEL MEDICO AERONAUTICO QUALE ELEMENTO DELLA MEDICINA PREVENTIVA].

M. Strollo (Aeronautica Militare, Ispettorato Logistico, Servizio di Sanità, Ufficio Studi, Rome, Italy).

*Rivista di Medicina Aeronautica e Spaziale*, vol. 32, Jan.-Mar. 1969, p. 5-18. In Italian.

Discussion of the tremendous importance of mental hygiene and preventive medicine in the flight surgeon's tasks of safeguarding the physical and mental welfare of aircraft pilots. An analysis of the work of flight personnel makes it possible to easily discern complex clinical pictures characterized by either work overload or exhaustion. It is noted that medical officers should be sufficiently informed about these clinical pictures in order to be able to offer adequate assistance, in the interest of both individual health and the productivity of the group involved.

M. M.

**A69-35302 #**

## RESPIRATORY BEHAVIOR OF B. COLI COMMUNE CULTIVATED ON VARIOUS SUBSTRATES UNDER AEROBIC AND ANAEROBIC CONDITIONS [COMPORTAMENTO RESPIRATORIO DEL B. COLI COMMUNE COLTIVATO IN AEROBIOSI ED ANAEROBIOSI DI FRONTE A VARI SUBSTRATI].

E. Sulli (Roma, Università, Istituto di Igiene; Aeronautica Militare, Ispettorato Logistico, Servizio di Sanità, Rome, Italy).

*Rivista di Medicina Aeronautica e Spaziale*, vol. 32, Jan.-Mar. 1969, p. 19-41. 17 refs. In Italian.

Investigation of the possibility that *B. Coli commune* may undergo possible changes in its respiratory activity when it is cultivated on various substrates under anaerobic conditions. Warburg's method was used in determining the oxygen consumption of part of the suspensions of *B. Coli commune* and of two different strains in the presence of various substrates. The results obtained have shown clear-cut and steady increases in oxygen consumption in strains

## A69-35303

previously grown under anerobic conditions and tested with succinic and malic acid. M.M.

## A69-35303 #

INFLUENCE OF FLIGHT AND COMMERCIAL PILOTING ON THE MORBIDITY OF CIVIL AVIATION PERSONNEL [INFLUENZA DEL VOLO E DEL PILOTAGGIO DI LINEA SULLA MORBOSITA' DEL PERSONALE DELL'AVIAZIONE CIVILE].

A. Polizzi di Sorrentino (Aeronautica Militare, Ispettorato Logistico, Servizio di Sanità, Rome, Italy).

Rivista di Medicina Aeronautica e Spaziale, vol. 32, Jan.-Mar. 1969, p. 42-62. 36 refs. In Italian.

Statistical investigation of the possible influence of flight and piloting on the appearance of certain morbid conditions and, consequently, on the psychic and physiological performance of civil aviation personnel. The following findings were made: (1) medical history concerning past functional troubles or diseases, as reported on personal records, together with clinical data for the years preceding enrollment in civil aviation service, is so inadequate, as a general rule, that it fails to constitute a reliable evaluation parameter; (2) a survey of diseases from which subjects suffered after the beginning of their flying activity, shows a significant incidence of enteric, hemorrhoidal, and respiratory diseases, the latter being acute. It is concluded that the examination of available records, although covering a restricted number of subjects, emphasizes the probability that diseases directly related to flying activity may appear and develop. M.M.

## A69-35304 #

MICROBIOLOGICAL PROBLEMS OF SPACE FLIGHT - SCREENING OF ASTRONAUTS FROM THE MICROBIOLOGICAL STANDPOINT [I PROBLEMI MICROBIOLOGICI DEL VOLO SPAZIALE - SELEZIONE DELL'ASTRONAUTA DAL PUNTO DI VISTA MICROBIOLOGICO].

E. Sulli (Aeronautica Militare, Ispettorato Logistico, Servizio di Sanità, Roma, Università, Istituto di Igiene, Rome, Italy).

Rivista di Medicina Aeronautica e Spaziale, vol. 32, Jan.-Mar. 1969, p. 63-101. 51 refs. In Italian.

Investigation of problems connected with the influence exerted by microbiological factors on the full efficiency of astronauts during and after long space flights. Special attention was devoted to the study of the effects of simulated microclimates and confinement on indigenous microbiological flora of candidates for space flight. The investigation was aimed at establishing certain parameters relating to the hygienic conditions of astronauts. M.M.

## A69-35305 #

AVIATION HEALTH SERVICE FOR PREVENTING FLIGHT ACCIDENTS [L'OPERA SANITARIA AERONAUTICA IN FUNZIONE DELLA PREVENZIONE DEGLI INCIDENTI DI VOLO].

M. Strollo (Aeronautica Militare, Ispettorato Logistico, Servizio di Sanità, Ufficio Studi, Rome, Italy).

Rivista di Medicina Aeronautica e Spaziale, vol. 32, Jan.-Mar. 1969, p. 102-118. In Italian.

Brief survey of flight safety problems, with particular reference to accident prevention. The physician's role, which calls for the effective and active surveillance of personnel on the job in the context of a man-machine relationship, is emphasized. It is pointed out that medical assistance should not be restricted to diagnostic model and the implications of the time-to-first-error concept were tested with a laboratory experiment using a vigilance task. The observed times to first miss error, times to false alarm error, and times to combined miss and false alarm errors were ordered, and through classical inference theory, the underlying density functions were isolated. A number of distributions were tested for

goodness of fit. The Weibull, gamma, and log-normal distributions emerged as relevant paradigms. The normal and exponential distributions were rejected. Computer output of distribution parameters and goodness of fit results are tabled. Comparison is shown of estimated and fitted means. It is concluded that the derived general mathematical model of human performance reliability and the expected value of the random variable (time-to-first-human-error) are meaningful ways to quantify human performance of time continuous tasks. (Author)

## A69-35440 #

SOME NONLINEAR FUNCTIONAL MODELS OF FREQUENCY DISCRIMINATION OF THE HUMAN EAR.

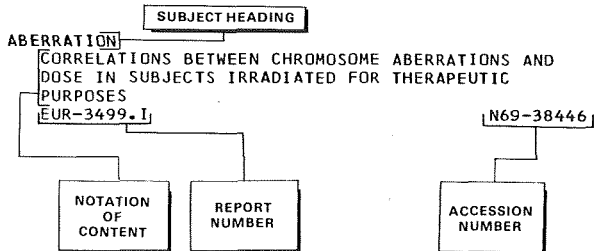
Anton Rozsypal, Vladimír Majerník, and Vladimír Balko (Slovenská Akadémia Vied, Fyzikálny Ústav, Bratislava, Czechoslovakia). Fyzikálny Časopis, vol. 19, no. 2, 1969, p. 85-92. 9 refs.

Description of three models for simulating functionally the auditory frequency-discrimination capability. It was found that frequency discrimination of short signals by the human ear cannot be modeled with the help of linear systems. Three possible ways of functional modeling of the frequency analysis of the human ear by means of nonlinear elements are discussed. The first method makes use of an intentional distortion of the signal, which is afterward analyzed by means of a linear system. Another method employs the so-called coincidence filter described by Schief (1963). Models of the third method simulate the neuron network of the auditory system. G.R.

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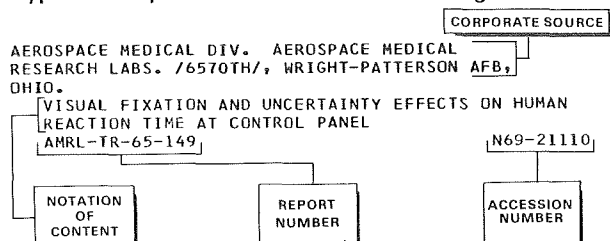
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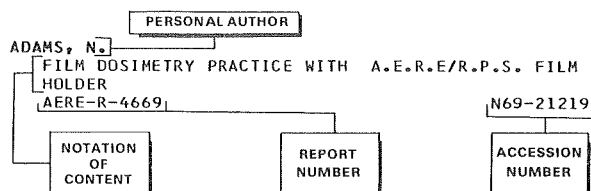


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